Consequences of the Black Sea Slave Trade: Long-Run Development in Eastern Europe [*]

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Abstract

We investigate the developmental consequences of slave-raiding in Eastern Europe, the largest source of slaves in the early modern world after West Africa. Drawing on a wide-ranging new dataset, we estimate that at least 5 million people were enslaved from 735 locations across the region between the 15th and 18th centuries. We hypothesize that, over time, slave raids encouraged an economically advantageous process of defensive state-building linked to raided societies' resistance to and lack of integration into the slave trade. Using difference-in-differences and instrumental variables strategies, we find that exposure to raids is positively associated with long-run urban growth and several related indicators of demographic and commercial development. Consistent with our posited mechanism, raided areas constructed more robust defenses and attained higher levels of administrative, military, and fiscal capacity. Our findings suggest that the structure of slave production conditions its developmental legacies, cautioning against drawing generalizations from the African context.

Keywords: slavery, economic development, historical legacies, state-building, Eastern Europe, Black Sea, historical political economy

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Introduction

Between the 15th and 18th centuries, nomadic groups from the Black Sea steppe captured and enslaved millions of people across Eastern Europe, raiding the southern borderlands of Poland, Lithuania, and Russia particularly intensely. Most captives were hauled to Crimea and exported to slave markets around the Ottoman Empire — from Constantinople to Cairo to Damascus — via an extensive network of merchants, gatekeepers, and watchmen. The remainder were sold locally or perished during the grueling march to Crimea. The upshot of these activities is the little-known fact that Eastern Europe was the largest source of slaves in the early modern world after West Africa (Khodarkovsky 2002, 22).

Despite considerable interest in the socioeconomic legacies of slavery, relatively little is known about the scale, scope, or developmental consequences of the Black Sea slave trade.[1] Our understanding of how slave-raiding influences long-run development is based almost exclusively on evidence from the transatlantic slave trade, which was dwarfed by its Black Sea counterpart until as late as the 18th century. In West Africa, demand from — and subsequently coercion by — European powers created incentives for rulers to adopt extractive institutions and social practices that maximized their capacity for (internal and external) slave production. An insecure and unpredictable economic environment ensued, with trade and investment stymied by pervasive violence, low levels of interpersonal trust, political instability, and ethnic fragmentation (Nunn 2008; Nunn and Wantchenkon 2011; Green 2013; Whatley and Gillezeau 2011; Obikili 2016; Fenske and Kala 2017).

In early modern Eastern Europe, demand for slaves from the expanding Ottoman Empire similarly encouraged some polities — principally the nomadic Crimean Khanate — to specialize in and organize their economies around slave-raiding. In major powers such as Russia and Poland-Lithuania, however, a wave of political consolidation in the late medieval period had brought an end to commercial slavery, reorienting economic activity toward the production of labor- and land-intensive com-

[1] The historian Alan W. Fisher's (1999, 105) observation continues to be valid: "Of all the post-Antic Western manifestations of slavery, that in the Islamic world is the least known. And among early modern Islamic states which maintained a slave system, the Ottoman Empire remains the least studied in this respect."

modities for export to Western Europe. As a result, these states neither participated in nor profited from the slave trade. To the contrary, they responded to nomadic raids by building permanent fortifications, mobilizing professional armies, and investing in weaponry and reconnaissance systems — measures that, in turn, required strengthening fiscal capacity and further centralizing administrative structures. Slave-raiding thus encouraged a process of defensive state-building that, we argue, stimulated sustained flows of labor, capital, and goods to exposed areas. Our central claim is that, while bearing the brunt of short-term damage from the slave trade, raided locations came to enjoy enduring economic advantages that provided the basis for higher levels of development over the long run.

To test this hypothesis, we construct and analyze the most comprehensive dataset on slave raids in early modern Eastern Europe. Our dataset, which draws on a rich array of historical sources, reveals that the Black Sea slave trade was fueled by at least 2,750 raids on 735 locations spanning 14 contemporary countries over 324 years. At a minimum, 3.7 million people were enslaved in these incursions; using imputation methods to account for missing information on captives, we estimate that the true figure lies in the region of 5 million. This represents more than a quarter of Eastern Europe's estimated population in 1400, shortly before the onset of the slave trade. This is comparable to the proportion of Africa's preexisting population that was exported in one of its four major early modern slave trades (just under one-third).

We begin our empirical investigation by examining the impact of slave raids on urban population growth, a widely used indicator of economic development in the pre-industrial era. Using a difference-in-differences strategy, we find that raided urban settlements exhibited similar population trends to non-raided settlements before and during the slave trade but markedly faster growth afterward. According to our baseline estimates, exposure to raids is associated with an increase in settlement population of more than one-third by the end of the 19th century. In settlements founded prior to the slave trade, there is evidence that raids initially brought about demographic losses — a pattern absent from settlements established after this point, many of which took the form of fortified garrison towns. These results hold across various specifications, including the use of heterogeneity-robust event study estimators, continuous measures of raid intensity, grid cells as the unit of observation, and alternative

sources of urban population data.

Next, we analyze a broader set of development indicators measured in the mid-19th century — around 75 years after the slave trade — for districts of the Russian and Austrian Empires. In the absence of over-time variation, we seek to identify the effect of slave raids using an instrumental variables strategy that exploits natural topographical features affecting nomadic access to different parts of the Black Sea region. We observe a consistently positive relationship between district-level raid intensity and development outcomes, including market and manufacturing activity in Imperial Russia, house and farm density in Imperial Austria, and population in both contexts.

Finally, we turn our attention to mechanisms, providing evidence of a link between exposure to slave raids and investments in defensive state-building. First, analyzing original geocoded data on permanent fortifications in southern Poland-Lithuania, we find that raided areas constructed significantly denser concentrations of such defenses than non-raided areas. Second, extending our instrumental variables strategy, we show that raid intensity is positively associated with the number of military and state officials in Russian urban communities in the 17th and early 18th centuries — an intense period of raiding — and negatively related to the number of traders and artisans. This pattern suggests that raids spurred expeditious improvements in defensive state capacity while initially hampering trade and production. In addition, raids predict higher levels of administrative, military, and fiscal capacity in late imperial Russian districts, indicating that early investments in state-building persisted over time.

We contribute to several areas of research, beginning with the influential literature on the developmental impact of slave-raiding, which has focused predominantly on Africa (Nunn 2008; Nunn and Wantchenkon 2011; Whatley and Gillezeau 2011; Fenske and Kala 2017; Obikili 2016). Taken together, our findings point to the structure of slave production as a key determinant of how raiding activity influences long-run development. When targeted societies resist integration into transnational systems of slavery, exposure to raids may encourage rather than impede processes of defensive state-building that are critical to enduring economic growth. While the sources of variation in responses to external slave demand merit further investigation, our analysis suggests that integration is less likely when states possess relatively high preexisting levels of political centralization and lucrative alternative export

opportunities.[2] The developmental benefits of defensive state-building take time to unfold, however, and slave-raiding can take a devastating human and material toll in the short run. Our results hence caution against generalizing inferences about slavery's economic effects drawn from the African experience.[3] Rather, they point to the value of a vibrant emerging research agenda that seeks to study slavery from a global — and explicitly comparative — perspective (Eltis and Engerman 2011; Sharman and Zarakol 2024).

Second, and relatedly, our conclusions speak to scholarship on the origins of state-building, which has until recently ignored slavery as an explanatory factor. Complementing agenda-setting research on the role of slaves in consolidating political authority in "consumer" states (Blaydes and Chaney 2013; Sharman and Zarakol 2024), our analysis shows that slave-raiding can promote administrative and fiscal centralization in "supplier" states. In doing so, it adds nuance to existing accounts of the evolution of state capacity in Eastern Europe, which have generally emphasized delays relative to Western Europe stemming from the absence of high-stakes military competition between major powers (Ertman 1997; Karaman and Pamuk 2013). If our findings are valid, slave raids may have served as a "substitute" for intense interstate warfare in stimulating state-building — albeit one whose consequences were less existential in nature and concentrated in border regions. These differences may explain why, despite eventually becoming strong enough to neutralize the nomadic threat, Eastern European states never attained the same level of (defensive or offensive) capacity as their Western European counterparts during the early modern era.

Third, we extend the growing body of systematic empirical research on the economic and political legacies of unfree labor in Eastern Europe (Dower et al. 2018; Buggle and Nafziger 2021; Markevich and Zhuravskaya 2018; Lankina and Libman 2021). Most of this work has concentrated on serfdom — a less extreme form of dependence — with studies of slavery typically restricted to individual states

[2] In Africa, traditionally low levels of centralization are believed to have impeded development (Michalopoulos and Papaioannou 2020) and weakened resistance to colonization (Hariri 2012). Their implications for how states responded to slave demand have received less attention.

[3] As Nunn (2008, 142) emphasizes, "Africa's slave trades were. . .unique because, unlike previous slave trades, individuals of the same or similar ethnicities enslaved one another." Note that even within Africa, responses to slave raids varied, with some states disintegrating amid internal strife (Obikili 2016) and others becoming more centralized — though typically no less brittle — as they expanded raiding operations (Sharman 2023).

and centuries. The few attempts to provide a comprehensive estimate of the size of the Black Sea slave trade rely, by necessity, on a mixture of extrapolation and educated conjecture (Kołodziejczyk 2006; Inalcik and Quataert 1994; Klein 2016).[4] To our knowledge, our dataset represents the only effort to exhaustively catalogue slave raids in Eastern Europe at a precise geographical level. While not guaranteed to encompass every raid that occurred, it lays the foundation for a deeper and more wide-ranging understanding of Eastern European slavery — a historically significant phenomenon that has been largely overlooked by social scientists — than previously possible. Lastly, our conclusions challenge and complicate the assumption made by some historians of the region that the slave trade was overwhelmingly detrimental to its development (Kołodziejczyk 2006; Khodarkovsky 2002), highlighting the importance of distinguishing the immediate impact of slave-raiding (which was almost certainly negative) from its long-run repercussions (which we find to be more favorable).

The Black Sea Slave Trade: An Overview

Origins and Organization

While slave-raiding in Eastern Europe dates back to antiquity, it remained limited and sporadic until the late medieval period. A series of devastating wars, culminating in Mongol invasions and the establishment of the Golden Horde in the 13th century, led to a pervasive state of insecurity and deprivation in which the abduction and sale of children became common (Roşu 2021, 9). The supply of slaves dramatically expanded in the mid-15th century with the disintegration of the Golden Horde and the fall of Constantinople, which reoriented Black Sea commerce toward the slave-dependent Ottoman Empire. The Crimean Khanate, a powerful Tatar successor state to the Golden Horde, was acquainted with agriculture but found slave-raiding more profitable for two reasons.[5] First, only coastal districts of the Crimean peninsula were suitable for intense cultivation, and their yields "were insufficient to

[4] These estimates focus on Muscovy and Poland-Lithuania and exclude the 18th century, generally suggesting that between 1 and 2.5 million people were enslaved in the two states before this point.

[5] A small number of raids were conducted by other Tatar offshoots of the Golden Horde, such as the Kazan Khanate and the Nogai Horde.

support the multitudinous warring layers" (Ivanics 2007, 193). Second, Crimean Tatars retained traditional nomadic skills and military know-how that enabled them to conduct rapid and destructive raids across the steppe. Ottoman control of the Black Sea and, from 1475, Crimea itself created a vast international market for Christian slaves — Muslims were prohibited from enslaving coreligionists — who came to play a central role in the empire's economy, military, and bureaucracy (Inalcik and Quataert 1994). The slave trade became a "cornerstone" of the Crimean economy, with captives outnumbering natives by between 2:1 and 3:1 (Kizilov 2007, 2).

While seemingly chaotic, nomadic slave raids were highly organized. Most campaigns were conducted either at harvest time or in winter — when frozen rivers and grassland could be more easily traversed on horseback — and were planned 3-4 weeks in advance (Kizilov 2007).[6] Raiding parties, ranging in size from several hundred to roughly 100,000, typically followed one of four trails stretching from the northern edge of the Crimean peninsula deep into the Black Sea steppe, which avoided topographical obstacles.[7] Raiders would approach their target area furtively, often traveling on moonless nights and switching between trails to confuse enemy watchmen, while undertaking continuous reconnaissance patrols (Davies 2007). A fortified field camp would then be constructed, from which raiders fanned outward as far as 140km, setting buildings alight and conducting demonstrative executions to arouse panic and fear (Gliwa 2016). Renowned for their speed and mobility, nomadic cavalrymen commanded multiple horses each and deployed a combination of bows and arrows, sabers, spears, and rope to seize captives (up to 6-7 per soldier) (Kizilov 2020, 253). Finally, the raiding party would reconvene and return to camp to divide up the spoils.

Captives were led to Crimea on foot and in chains, with the ill or wounded frequently killed to avoid slowing down the march. Upon arrival, a small number were retained for ransom — generally nobility and high-ranking military officers — or domestic and agricultural work, while the rest were distributed to one of Crimea's many slave markets, the largest being the port of Caffa (modern Feo-

[6] Raids occasionally took place during joint military campaigns with Ottoman, Cossack, or Nogai forces, in which case they were organized in a more ad hoc fashion.

[7] These routes were known as the Woloski Trail, the Czarny Trail, the Kuczman (or Podole) Trail, and the Murawa Trail.

dosia).[8] There, an assortment of handlers, gatekeepers, watchmen, and brokers categorized captives according to sex, age, and skill; assigned them to a storage facility; and, within a few days, sold them to a local merchant (Fisher 1999, 35).

The vast majority of purchased slaves were shipped via the Black Sea to commercial centers across the Ottoman Empire, such as Bursa, Cairo, Constantinople, Damascus, and Edirne, or to smaller towns with slave markets, such as Haskovo, Nova Zagora, and Kazaluk in Bulgaria (Kołodziejczyk 2006). Approximately 70% of slaves sold in Caffa made the 10-day journey to Constantinople, where several thousand people — including a guild of 2,000 merchants based in the Grand Bazaar — made a living off the slave trade (Fisher 1999, 584). Male slaves usually ended up working in agriculture, construction, small craft production, or the military; female slaves were used mainly in domestic service, either as concubines of their owner or as servants of his legal wives (Fisher 1999, 120).

Scale and Scope: New Geocoded Data

Nomadic slave raids in early modern Eastern Europe are known to have occurred from the 15th to the 18th century and to have centered on Poland-Lithuania and Russia. The full extent of this complex system, however, remains surprisingly unclear. To gain a better understanding, we collected data on the timing, location, and yield of all Ottoman-era raids recorded in more than 500 primary and secondary sources, the most important of which are enumerated in Table A1 of Online Appendix A.

Our data-gathering process proceeded in four steps. First, we compiled an exhaustive list of raids mentioned in modern scholarship on the Black Sea slave trade in English, French, German, Hungarian, Polish, Russian, Turkish, and Ukrainian. Second, where possible, we consulted the original sources referenced in this research to verify dates and figures, acquire additional information (e.g., more precise locations, raiding party size, collateral damage), and check for unreported raids. While most of these sources take the form of historical chronicles assembled by monastic or court scribes, they range from property registers and treasury accounts to diplomatic documents and military lists.

[8] Other markets included Anapa, Bakhchysarai, Karasubazar (Bilohirsk), Kerç (Kerch), Gözleve (Yevpatoria), and Taman.

Third, to err on the side of caution, we excluded raids whose source has been questioned by historians or lacks clarity on whether captives were actually taken. Finally, we geocoded the remaining raids, which in some instances required matching historical and contemporary location names using archival maps.

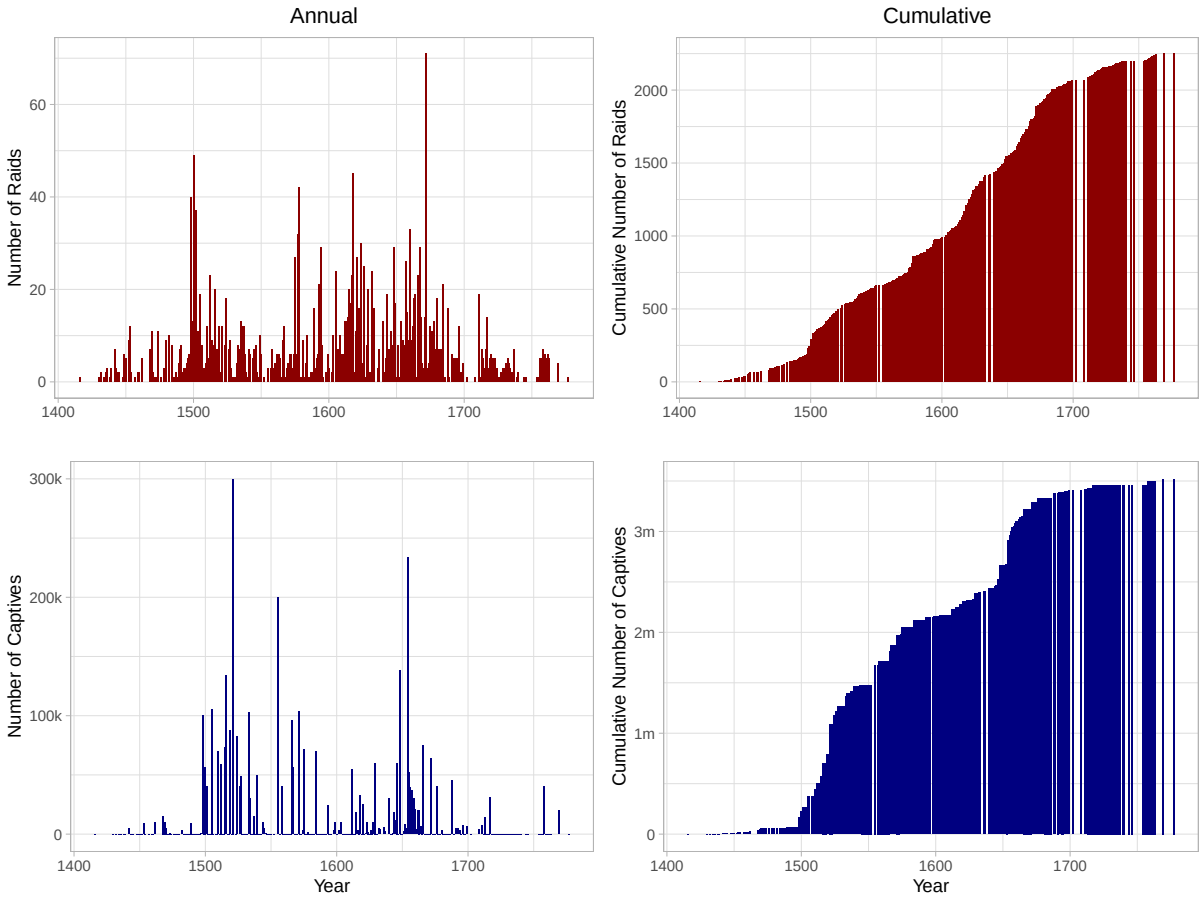
In total, our dataset comprises 2,789 raids conducted between 1453 and 1777 in 735 locations spanning 14 contemporary countries: Belarus, Croatia, the Czech Republic, Estonia, Hungary, Lithuania, Moldova, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, and Ukraine. Some 3.68 million captives were seized in these raids, an average of 1,321 per raid.[9] It is crucial to note, however, that information on captives is missing for 52% of raids, implying a far higher true number. Replacing missing values with the mean of observed ones (mean imputation) yields a total of 7.7 million captives. A more sophisticated multiple imputation model, which includes raid longitude, latitude, location type, year, and party size as predictors, provides a more conservative mean estimate of 5.06 million (with a range of 4.30-6.11 million).[10] We find the latter figure, which we discuss in detail in Online Appendix B, considerably more plausible, not only because it leverages predictive information in a statistically principled manner but also because raids that lack data on captives are likely to be smaller, on average.

Based on demographic estimates from the History Database of the Global Environment (Klein Goldewijk et al. 2017), our multiply imputed total implies that 26.6% of Eastern Europe's population in 1400 was enslaved over the subsequent four centuries. It is not possible to calculate this proportion in the case of Africa's slave trades, for which scholars have only calculated the aggregate number of *exported* slaves. The latter figure — approximately 18 million (Nunn 2008) — represents 32.8% of Africa's estimated population in 1400. As a high proportion of Eastern European slaves are believed to have been exported to Ottoman lands (Kołodziejczyk 2006, 151), it seems reasonable to view the Black Sea slave trade as roughly comparable to its African counterparts in terms of aggregate demo-

[9] In the few instances where sources provide conflicting captive numbers for a given raid, we take the average. As shown in Figure A1 of Online Appendix A, the distribution of captives per raid is left-skewed, with almost 90% of raids yielding fewer than 5,000 captives.

[10] We employ the machine learning-based technique of multiple imputation with denoising autoencoders (MIDAS) (Lall and Robinson 2022), generating a total of 1,500 completed datasets using 75 combinations of three key model parameters.

FIGURE 1. Frequency of Nomadic Slave Raids in Eastern Europe, 1453-1777



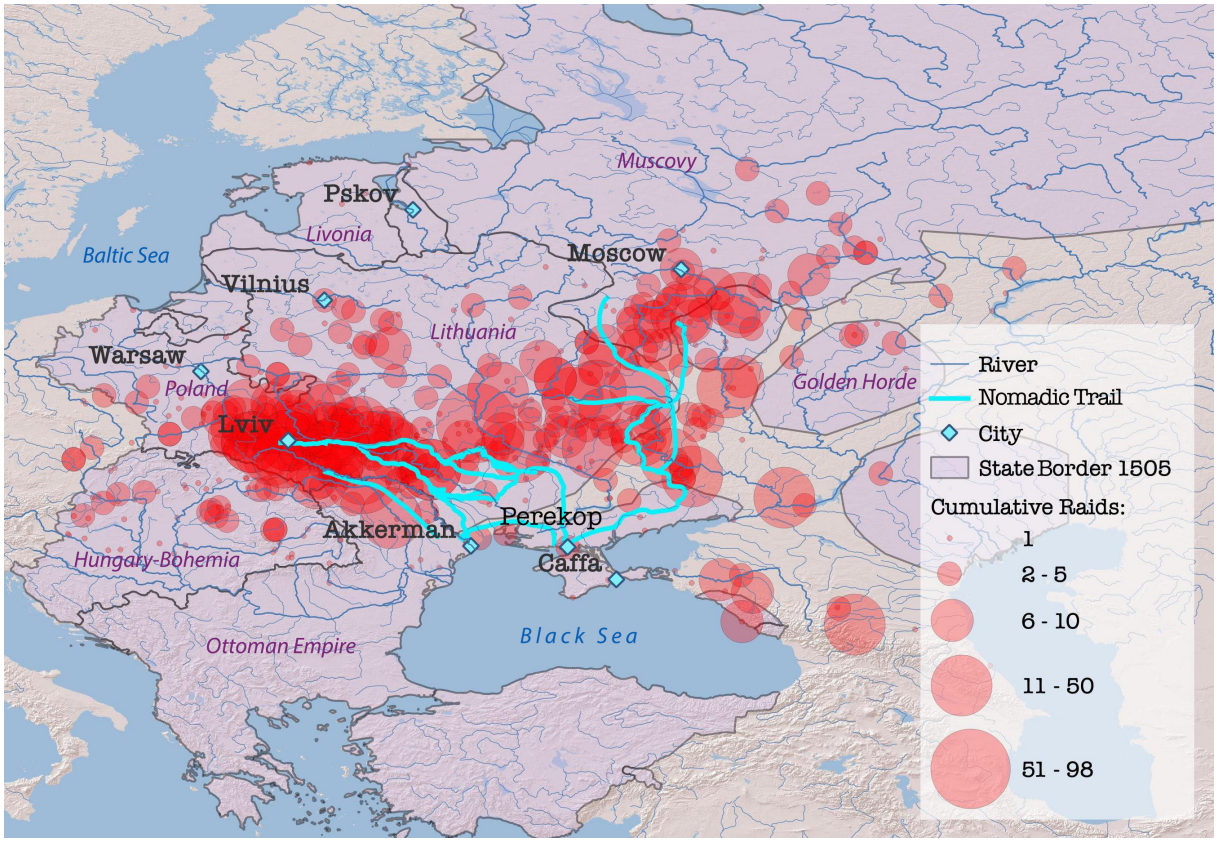
Notes: The left column shows the annual number of raids (top row) and captives (bottom row, in thousands); the right column shows the cumulative number of raids (top row) and captives (bottom row, in millions).

graphic burden.

Two caveats about our dataset should be mentioned. First, it is unlikely to be complete. Some raids may not have been recorded by contemporaries (for instance, due to their small size or remote location), and not all archival material relating to the Black Sea slave trade may have been accessed by historians. While information about raids surely varies with location size and prominence, localities with fewer than 5,000 inhabitants constitute the bulk of our dataset, suggesting that our sources provide good coverage of minor settlements.[11] Second, neither raid nor captive numbers should be

[11] Among larger settlements, we later show that there is no relationship between pre-slave trade population and exposure to raids.

FIGURE 2. Geographical Distribution of Nomadic Slave Raids



Notes: This map displays the location of 2,789 nomadic slave raids in Eastern Europe between 1453 and 1777.

taken as exact. In addition to the problem of missing data, there is no guarantee that every historical source is accurate (though we have seen no evidence of systematic exaggeration or underreporting). For these reasons, it is prudent to treat our data as indicating approximate orders of magnitude rather than precise quantities.

With these qualifications in mind, the dataset opens a rich window on the scale, scope, and dynamics of slave-raiding in Eastern Europe. Figure 1 plots the annual and cumulative number of raids and (non-imputed) captives between 1400 and 1800. Raids were conducted fairly consistently throughout the period, particularly in the 16th and 17th centuries. Nevertheless, there are discernible peaks in the first decade of the 1500s (238 raids), the 1570s (151), 1610-1630 (419), and 1660-1680 (367). While more sparse due to missing data, captive numbers exhibit similar crests in the first half of the 16th century (1.34 million captives) and the mid-17th century (0.67 million between 1650 and 1660). According to

our imputation model, 4.79 million captives — 95% of the total — were taken by 1700. The number of Africans exported in the transatlantic slave trade by this date is estimated at 1.28 million (Slave Voyages 2021).

Three years stand out for their sizable captive yields: 1521, when an army of 100,000 nomads invaded southern Russia, seizing 300,000 people from towns and villages up to the outskirts of Moscow, from which Grand Prince Vasilii III was forced to flee to Volokolamsk; 1555, when 60,000 nomads breached the same area, crushing a Muscovite army at Sudbishchi and returning with 200,000 captives; and 1654, when nomadic forces allied with Poland plundered the southwestern region of Cossack Ukraine, enslaving 200,000-300,000 people in addition to burning 270 towns and villages, destroying 1,000 churches, and killing 10,000 children.

Figure 2 displays the geographical distribution of slave raids with state borders from the early 16th century. Raids spanned the full extent of Eastern Europe, ranging longitudinally from the Black Sea to the Vyatka River basin (roughly 4,000km) and latitudinally from the Baltic Sea to the Caspian Sea (roughly 3,000km). Even so, they were heavily concentrated in two areas: the stretch of western Ukraine and southeastern Poland ruled by the Crown of Poland and the Grand Duchy of Lithuania until 1569 and by the Polish-Lithuanian Commonwealth thereafter (71% of all raids); and southern Russia, which was part of Muscovy (20%).[12] Not by coincidence these areas are directly intersected by the four major nomadic trails used to conduct raiding campaigns (indicated by thick lines).[13] In terms of contemporary borders (see Figure A2 in Online Appendix A), 60% of raids took place in Ukraine, 20% in Russia, 12% in Poland, 3% in Romania, 3% in Belarus, 1% in Hungary, and less than 0.5% in the remaining eight countries listed above.

[12] The remaining 9% of raids were spread across nine states, including Hungary-Bohemia, Wallachia, and the Ottoman Empire. The five most raided locations were Kamianets-Podilskyi (108 raids), Vinnytsia (95), Volodymyr (87), Zhytomyr (84), and Lviv (65).

[13] We reconstruct the trails using a variety of historical maps and descriptive accounts (Novoselskiy 1948; Horn 1962; Rzepa 1963; Zaporiz'kyi Natsional'nyi Universytet 2006; Polczynski and Polczynski 2018).

From Slave-Raiding to State-Building

While few societies throughout history have been spared the ravages of slave-raiding, responses to external demand for enslaved labor have varied widely. In West Africa, slaves were commonly used but rarely exported before the 17th century, with demand coming primarily from domestic producers of gold, copper, salt, and other mined resources (Inikori 2011). European conquest of the New World radically altered this pattern, creating massive demand for cheap manpower to fuel plantation and mining economies across the Americas. The resulting spike in the price of slaves and decline in the price of precious metals significantly raised "the returns to slave raiding for export, relative to other economic activities" (Sharman 2023, 498). Responding to these incentives, many West African states began to specialize in slave-raiding, taking advantage of — and often becoming dependent upon — European weapons and gunpowder technology (Nunn 2008, 142-143).[14]

For several centuries following the fall of Rome, parts of Europe experienced similar pressures, as "a slave trade from the less developed north, west, and east sent a stream of slaves drawn from various European peoples to the more prosperous areas of the south and the Mediterranean" (Eltis and Engerman 2011, 19). In Latin Europe, slave raids ended in the 10th and 11th centuries with the emergence of proto-states capable of controlling their borders and regulating trade (Fynn-Paul 2018, 573). In Northern and Eastern Europe, where political centralization proceeded more slowly, slavery flourished until the late medieval period. Poland's *Piast* dynasty captured and sold slaves of East Slavic origin until the 14th century (Hellie 1982, 696), when it unified governance and legal structures and began exporting agricultural commodities such as wheat, millet, and rye, demand for which was rising in Western Europe. Further east, slave-raiding was "drastically curtailed with the consolidation of the Muscovite state at the end of the fifteenth century" (Hellie 1982, 22), which started supplying Western Europe with timber, furs, salt, flax, and hemp.

By the time Ottoman demand for slaves expanded, therefore, much of Eastern Europe was gov-

[14] This shift was compounded by the absence of a meaningful agricultural surplus for export, a consequence of poor tropical soil quality as well as technological limitations, most notably the delayed adoption of the wheel and the plough (Goody 1971).

erned by relatively large and centralized states whose economic fortunes were increasingly tied to trade in labor- and land-intensive commodities with Western Europe. Rather than adapting to and participating in the slave trade, these powers sought to thwart nomadic incursions and stem population losses — a difference with critical implications for how they allocated material, administrative, and military resources.[15] To ensure their internal security and territorial sovereignty, raided states embarked upon an ambitious program of defensive state-building involving the construction of permanent fortifications, the mobilization of armed forces, and the consolidation of bureaucratic and fiscal capacity. This strategy, we argue, entailed far-reaching developmental consequences.

Muscovite Russia, whose vulnerable position "astride the great east-west Eurasian steppe corridor of nomadic movement" made it "obsessed with defense" (Gibson 2002, 183), took the most extensive measures to secure its borders. Beginning in the early 16th century, Russian rulers erected a string of garrison towns connected by abatises (*zaseka*) along the state's southern perimeter, which supported reconnaissance patrols, signaling, and other defensive maneuvers by the frontier field army. The Bereg Line was built along a vulnerable 250km stretch of the Oka River between Kolomna and Kaluga, followed by the 500km Arbatis (Tula) Line, the 800km Belgorod Line, and the 530km Izium Line. These were major undertakings — Stevens (1995, 133-135) estimates that 30,000 men worked on the Izium Line alone — that necessitated sizable population transfers and capital investments. Soldiers in western and northern Russia were lured south with the promise of landed estates, while Cossack mercenaries from the Pontic-Caspian steppe were invited to settle in garrison towns in exchange for property and grain (Davies 2007). Peasants and laborers were also encouraged to join garrisons, whose commanders were explicitly instructed to retain — not return — fugitive serfs enrolled in military service (Stevens 1995, 26). As a result of these efforts, Russia's southern frontier became ever more difficult — and eventually impossible — to permeate, facilitating further settlement as well as the expansion of large-scale agriculture.[16] During the 18th century, Muscovy extended its writ all the way

[15] On the importance of political centralization for resisting external threats, see Hariri (2012).

[16] In an interesting contrast, Russia also expanded into resource-rich Siberia in the 16th century, yet here needed little defensive investment to suppress the indigenous nomadic population. Consequently, as Kollman (2017, 65) notes, "Russia's administrative authority [in Siberia] was skeletal."

to the shores of the Black Sea, annexing Crimea in 1783.

Poland-Lithuania likewise invested in arming and fortifying its southeastern periphery, albeit with stiffer internal resistance from its powerful landed nobility. In 1520, Sigismund I centralized military and administrative authority by issuing an ordinance for the state's "common defense" by a front guard tasked with monitoring the border and a larger infantry unit tasked with halting incursions (Adamczyk 2004, 38-39). Soon after, Zaporozhian Cossacks were enlisted to support the defensive effort in exchange for payment, land, and special privileges. When they rebelled in the mid-17th century, forming an alliance with the Crimean Khanate and raiding Polish settlements, regional governments responded by establishing a permanent mercenary army (*wojsko komputowe*).

In addition, Poland-Lithuania assembled a network of interconnected fortifications across the border zone, which came to be known as its "bastion" against Islamic invaders. In 1620, the legislature, or *Sejm*, ordered cities in this area "to prepare for defense and garrison according to the instructions of hetmans and royal representatives" (Adamczyk 2004, 46). A few decades later, local assemblies (*sejmiki*) were mandated to use state funds to fortify one city within their jurisdiction and maintain a permanent garrison in six cities. *Sejmiki* themselves contributed to the fortification drive by reimbursing the costs of — and in some cases providing tax breaks for — construction activity (Adamczyk 2004, 46). Some members of the nobility resisted these centralizing dictates, preferring to deal with raids by building private castles, marshaling local militias, and arming dependents. Wyrobisz (1989, 624) contrasts the response of noblemen in Red Ruthenia, which was heavily targeted by raiders, and in Cracow (Kraków), which was less exposed: "The nobles of the Ruthenian voivodeship demanded that the border towns have good defenses and be suitably manned by soldiers, even conceding certain sums of money for this purpose. But the nobles of the Cracow voivodeship, less threatened than those of the Ruthenian voivodeship, adopted a different attitude in those matters."

Financing defensive investments required the development of new fiscal instruments. Muscovy introduced an array of raid-related taxes in the 16th and 17th centuries, including construction duties, fortification officials' fees, and a levy specifically to cover captive ransoms (Khodarkovsky 2002, 22). These were supplemented by an in-kind grain tax supporting a centrally directed food supply sys-

tem that sustained border armies during campaigns, delivered emergency supplies to garrison towns, and paid Cossack salaries (Stevens 1995). During the 16th century alone, financial obligations to the Muscovite state increased sixfold, adjusting for inflation (Zlotnik 1979, 253-254). In 1679, Russia's increasingly complex fiscal apparatus was consolidated via the introduction of a simplified direct tax. The following year, a national exchequer (*Bolshaia Kazna*) was established, laying the foundations for the first Russian state budget (Stevens 1995, 84).

The *Sejm*, in a similar vein, raised taxes several times to finance military activities in raided areas. After a chastening defeat by a Tatar-Ottoman army in the 1620 Battle of Cecora, which unleashed a vicious wave of slave raids across southeastern Poland, it approved a tax hike large enough to mobilize a 60,000-strong standing army (Adamczyk 2004, 24). Like Muscovy, Poland-Lithuania additionally levied a series of more ad hoc raid-related taxes for purposes such as ransoming captives and sending tribute to the Crimean Khanate to forestall raids (a strategy that largely failed). While once again encountering opposition from elements of the nobility —- with the result that tax rates and soldier numbers fluctuated with raid intensity — these measures marked the beginnings of a unified public treasury distinct from the ruler's personal account (Guzowski and Sowina 2023, 366).

Slave Raids, Interstate Warfare, and Development

The preceding discussion suggests that the developmental consequences of slave-raiding in early modern Eastern Europe may be better understood by analogy with interstate warfare in contemporary Western Europe than with reference to the transatlantic slave trade. Wars inflicted immediate economic damage on Western European states, reducing populations, fueling epidemics, and destroying capital stock. Over a longer time span, however, they set in motion a process of sustained state-building — Tilly's (1990) famous "war made the state" thesis — that is widely viewed as instrumental in the region's subsequent economic ascent.[17] Faced with cutthroat military competition, rulers centralized coercive structures, consolidated fiscal systems, and professionalized bureaucratic institutions. Urban

[17] War was by no means the only driving force behind state-building. Grzymała-Busse (2023), for instance, highlights the role of the medieval Catholic Church in providing templates for governing institutions and laws across Europe.

settlements were key beneficiaries, attracting mass migration as they developed into safe harbors from conflict, administrative centers, and production hubs (Dincecco and Onorato 2017). These trends contributed to secular economic growth through several related channels, including the accumulation of human capital, economic agglomeration effects, and the improved provision of public goods (such as rule of law, security, and infrastructure) (Besley and Persson 2010; Dincecco and Onorato 2017).

If the analogy between nomadic slave raids and interstate warfare is appropriate, we might expect defensive state-building initiatives in raided areas of Eastern Europe to stimulate long-term development via a similar set of mechanisms. Much descriptive evidence is consistent with this expectation. Between 1500 and 1650, a severe period of raiding activity, the number of urban settlements in Red Ruthenia doubled (Bogucka and Samsonowicz 1986, 17). Although constructed to protect local magnates' property and dependents from raids, many of the new settlements soon gained commercial as well as military significance. In Muscovy, 79 garrison towns were founded in Belgorod and Sevsk — the provinces most exposed to raids — by the late 17th century. These towns rapidly expanded as soldiers, peasants, and laborers poured in, spurring trade and investment across Russia's periphery. For instance, the fortress of Voronezh, established in 1585 to monitor the Oka-Don plain for nomadic incursions, became the largest city in southern Russia during the 17th century.

It was not only new settlements that underwent such transformations. A striking case is Kyiv, which was sacked by nomads so frequently and thoroughly in the 15th and 16th centuries that it remained "practically empty" for decades (Subtelny 2009, 83). An intensive fortification effort led by the Polish-Lithuanian state dramatically reversed Kyiv's fortunes over the next 300 years, boosting its population from less than 10,000 to almost a quarter of a million as it morphed into an "administrative, military, commercial, and cultural center" (Subtelny 2009, 185).

At the same time, it is important to recognize the limits of the "war made the state and city" analogy. First, initial social and political conditions differed in Eastern and Western Europe. In Poland-Lithuania, the entrenched power of the landed aristocracy curtailed some forms of military investment and fiscal consolidation, a key reason why the state was less successful than Muscovy in securing its

borders — and eventually collapsed (Ertman 1997). In both states, the institutionalization of serfdom — eradicated in Western Europe following the Black Death — restricted peasant migration to cities, slowing urban growth and the transition from low-productivity agriculture to high-productivity industry (Dincecco and Onorato 2017; Buggle and Nafziger 2021). Second, unlike interstate warfare, nomadic raids did not represent an existential threat. Nomads did not seek to conquer or occupy territory, lacking the numbers and firepower necessary to succeed in conventional battle; without an element of surprise, nomadic cavalry stood little chance against a properly equipped standing army (Gliwa 2016). Accordingly, the stimulus to state-building — and, by extension, long-run development — delivered by slave-raiding in Eastern Europe is likely to have been smaller and more localized than that provided by interstate warfare in Western Europe.

Slave Raids and Urban Population Growth

We begin our empirical investigation by examining the relationship between nomadic slave raids and urban population growth over the early modern era. As cities have historically depended on high levels of agricultural productivity and economic specialization, their size is generally considered a key indicator of development in this period (De Long and Shleifer 1993). Furthermore, it is the only such indicator on which data are available for the whole of Eastern Europe before, during, and after the Black Sea slave trade.

Data and Empirical Strategy

Our analysis combines the compendium of slave raids introduced earlier with the European Urban Population, 700-2000 database compiled by Buringh (2021). The latter source, which updates and expands Bairoch, Batou, and Pierre's (1988) seminal population tables using recent archaeological and demographic research, records the number of inhabitants (in thousands) in 2,262 urban settlements across 43 European countries at one-century intervals from 700 to 1500 and at half-century intervals from 1500 to 2000. Bairoch, Batou, and Pierre include all settlements with 5,000 or more inhabitants

at some point between 800 and 1800; Buringh adds those with at least 1,000 inhabitants in 700, at least 100,000 inhabitants in 2000, and capital city status in 2000.[18] While its relatively infrequent reporting intervals inhibit our ability to detect short-run population losses caused by raids, the database paints a reasonably comprehensive and precise picture of European urban demographic trends over the long run.

Our baseline model focuses on the 550 Eastern European settlements in the European Urban Population database — 23% of which were raided at least once — between 1100 and 1900 (leaving at least a century before and after the slave trade).[19] To identify the impact of raid exposure on settlement population, we pursue a difference-in-differences strategy that compares the average change in the population of raided and non-raided settlements after the onset of raids. Our specification can be expressed as:

$$\log(P_{st}) = \alpha + \beta R_{st} \times \text{Post}_t + \gamma_s + \delta_t + \varepsilon_{st} \tag{1}$$

where P_{st}, the outcome variable, is the logarithm of settlement s's population in period t; R_{st}, the treatment variable, is a dummy for whether s has been raided as of t; $Post_t$ is a dummy for period t after 1400, which we vary between 1500 and 1900 to examine how the treatment effect evolves over time; and γ_s and δ_t denote settlement and period fixed effects, respectively.[20] We cluster heteroskedasticity-robust standard errors at the settlement level.

Provided that the population of raided and non-raided settlements would have followed the same trajectory in the absence of the slave trade — the parallel trends assumption — β in Equation 1 identifies the average effect of exposure to raid on settlement population in period t. Figure 3, which plots the logged mean population of raided settlements and non-raided settlements in Eastern Europe as well as Europe as a whole over the sample period, provides initial plausibility for this assumption.[21] Over the three centuries preceding the slave trade, population evolved similarly in the two types of

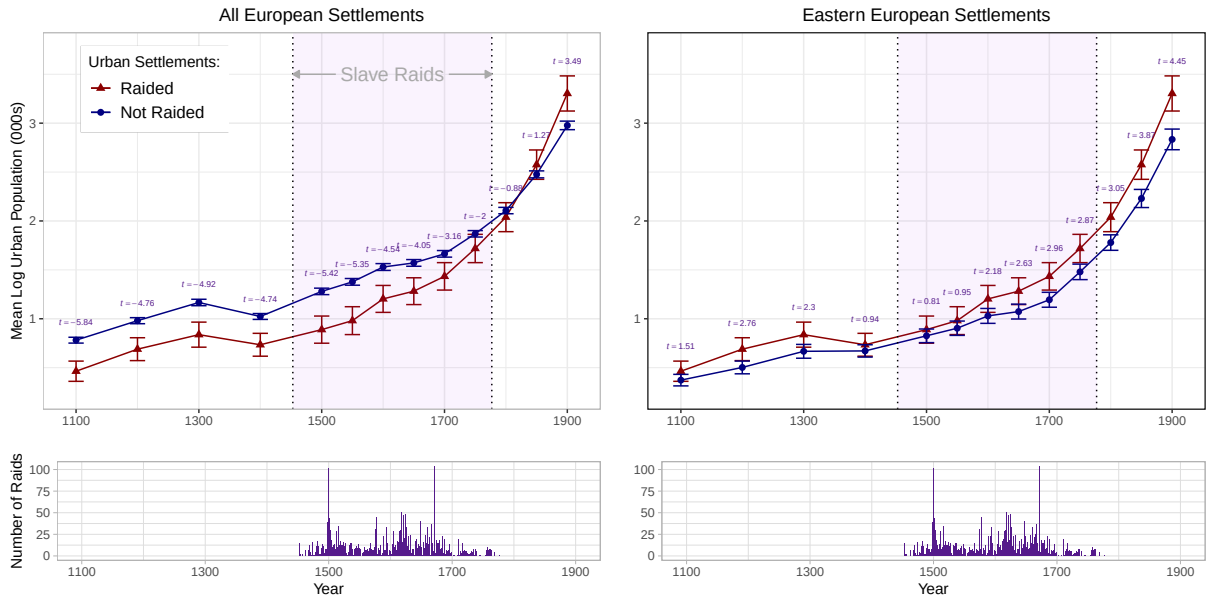
[18] Settlements do not drop out of the dataset if their population falls to 0.

[19] We follow the United Nations Regional Group demarcation of Eastern Europe. Around one-fifth of raided locations feature in the sample.

[20] Summary statistics for all variables in the analysis are provided in Table A2, Online Appendix C.

[21] Figure A4 in Online Appendix C presents the same comparison for individual raided and non-raided settlements.

FIGURE 3. Mean Population of Raided and Non-Raided Settlements, 1100-1900



Notes: Mean logged population (in thousands) of raided and non-raided urban settlements between 1100 and 1900. Bars represent 95% confidence intervals; the text above them indicates t-statistics from a two-sample t-test of the difference in means between raided and non-raided settlements. The lower row displays the total number of raids per year.

settlements, rising steadily between 1100 and 1300 before declining slightly due to the Black Death. Note, moreover, that raided settlements began to exhibit consistently faster population growth than non-raided settlements toward the end of the slave trade — by 1900, the former boasted an average of 25,572 more inhabitants than the latter in the Eastern European sample and 15,673 more inhabitants in the full European sample — which is suggestive of a positive long-run treatment effect.

As a more rigorous test of the parallel trends assumption, we additionally estimate an event study specification of the form:

$$\log(P_{st}) = \alpha + \sum_{j=-8}^{8} \beta_j D_{s,t-j} + \gamma_s + \delta_t + \varepsilon_{st} \tag{2}$$

where $D_{s,t-j}$ is a dummy for period j relative to the first raid on settlement s in period t (meaning that this raid occurred j periods before t).[22] Following common practice, we use the period before the

[22] As the maximum number of periods between the first raid and 1900 is eight, we vary j between -8 and 8.

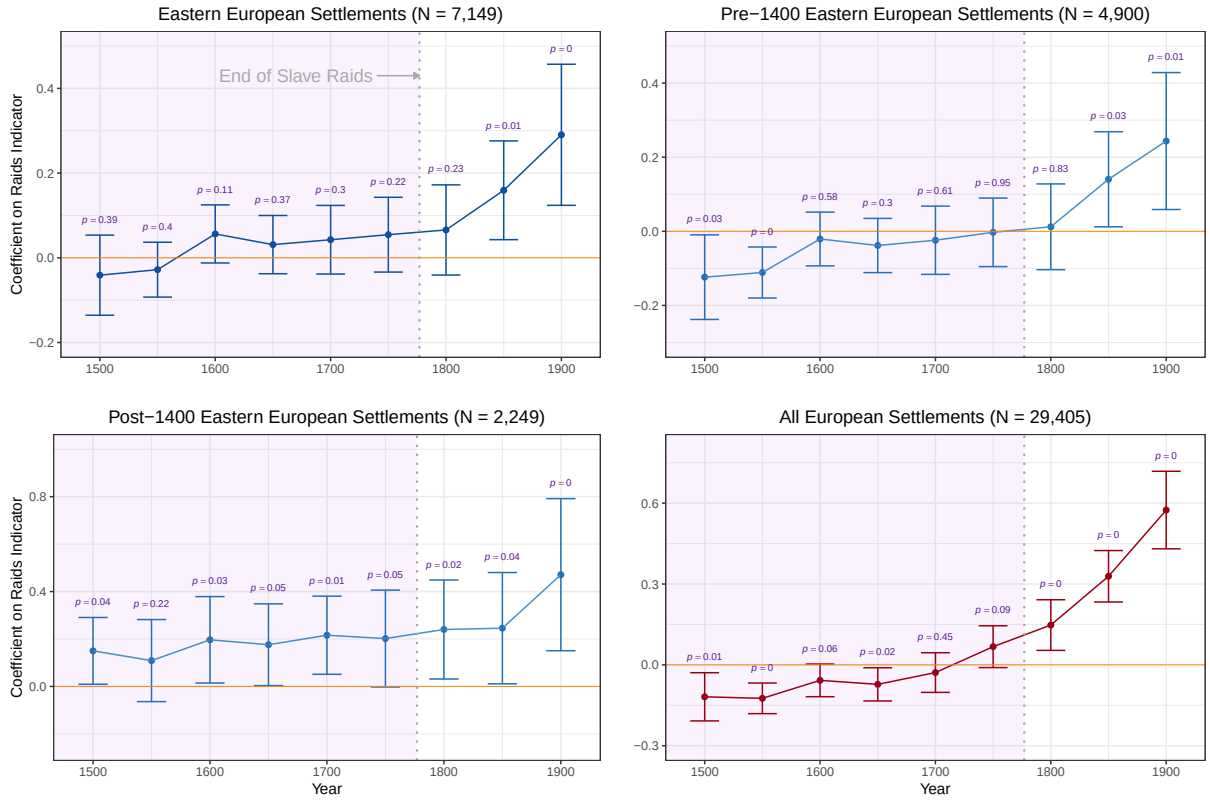
first raid as the reference for estimating treatment effects (by setting β_{-1} to 0). To avoid inferential problems arising from treatment effect heterogeneity, we supplement this specification with several alternative event study estimators that exclude potentially problematic comparisons between already-treated units, including Sun and Abraham's (2021) interaction-weighted estimator, which compares treated units with never-treated or last-to-be-treated units; Liu, Wang, and Xu (2024) and Borusyak, Jaravel, and Spiess's (2024) imputation-based estimators, which impute counterfactual outcomes for treated units; and Callaway and Sant'Anna's (2021) doubly-robust estimator, which specifies never-treated or not-yet-treated units as the comparison group. In all models, robust standard errors remain clustered by settlement.

Results

The upper left panel of Figure 4 displays the baseline difference-in-differences estimates (from Equation 1) with 95% confidence intervals. Consistent with a positive long-run effect of raid exposure on settlement population, the coefficient on the treatment indicator grows over time, particularly following the conclusion of the slave trade, when it becomes both positive and statistically significant. On average, exposure to raids is associated with a 4% decline (p=0.39) in population in 1500, a 4% increase in 1700 (p=0.30), and a 34% increase (p=0.001) in 1900.

The remaining panels show concordant results with three alternative samples. In the upper right and lower left panels, we restrict the analysis to settlements founded before and after the onset of the slave trade, respectively. In line with our argument, there is clearer evidence that raids initially reduced population in pre-slave trade settlements (69% of the total): the treatment effect is negative throughout the slave trade and significant in 1500 and 1550, when defensive state-building was in its fledgling stages. In contrast, this effect is consistently positive and significant or near significant for post-1400 settlements (31% of the total), which were often established for defensive purposes and thus received immediate inflows of military servicemen. An initial dip is also apparent when we expand the sample to all European settlements (lower right panel), as is a positive and significant treatment effect

FIGURE 4. Slave Raids and Urban Population Growth: Difference-in-Differences Estimates



Notes: Difference-in-differences estimates of the impact of exposure to nomadic slave raids on the logged population of urban settlements (in thousands) over 13 periods between 1100 and 1900. All specifications include settlement and period fixed effects. Bars represent 95% confidence intervals based on robust standard errors clustered by settlement.

after the slave trade. That is, exposure to raids is associated with faster long-run urban population growth even when the control group includes Western European settlements, which were generally larger and more prosperous in the early modern era.

Figure 5 presents the event study estimates for our baseline Eastern European sample with the two-way fixed effects (Equation 2), Sun and Abraham, Liu, Wang, and Xu, and Callaway and Sant'Anna estimators. With every estimator, there is clear support for the parallel trends assumption: the coefficient on the treatment time indicator ($D_{s,t-j}$) is statistically indistinguishable from 0 in every period before raids begin. It becomes positive and mostly significant during the treatment phase, rising sharply in the first four periods, before dipping slightly and then increasing again. The two-way fixed

effects estimates imply that settlement population grows 3% in the (50- or 100-year) period in which raids first occur, 16% in the third period, 27% in the fifth period, and 38% in the eighth period. They are therefore less consistent with an instant decline in population than the difference-in-differences estimates — which should not be surprising, given that they are capturing average treatment effects across the *entire* slave trade (not only its early stages). As illustrated in Figure A7 of Online Appendix C, the event study results remain similar when we expand the sample to all European settlements.[23]

Robustness

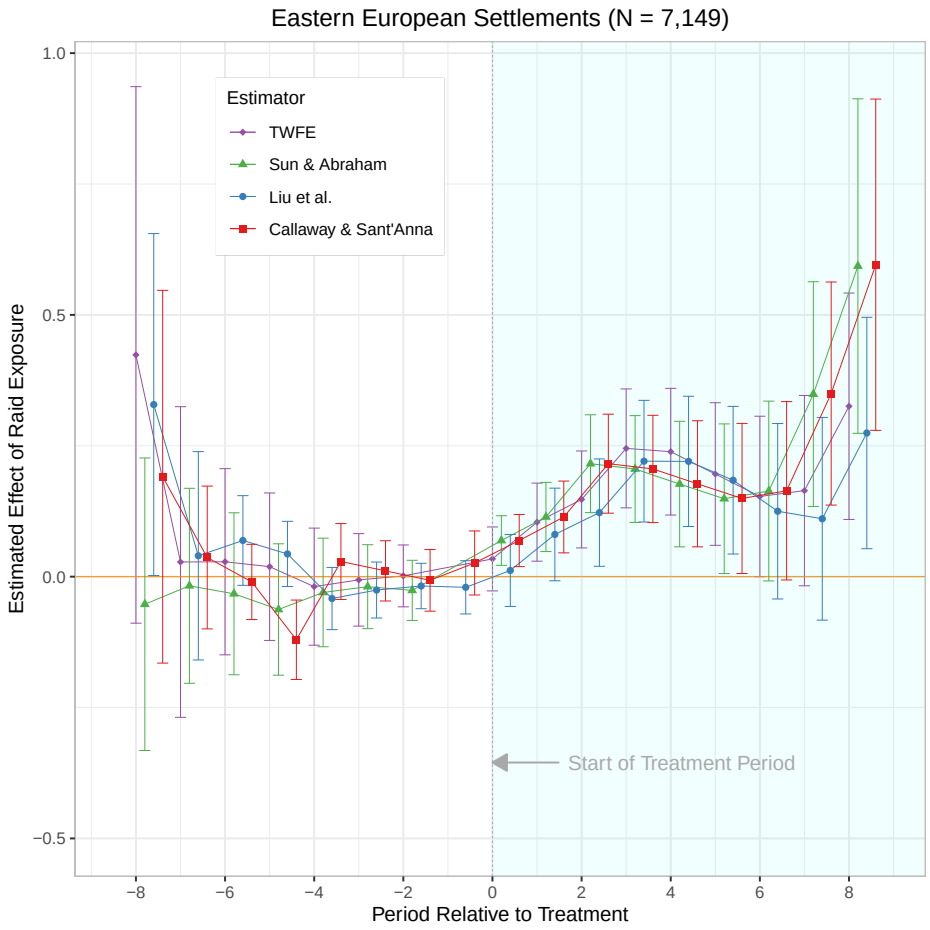
The baseline results are robust to several alternative specifications, estimates from which are reported in Online Appendix C. First, to address the possibility that unobserved heterogeneity is correlated across proximate settlements, we estimate Equation 1 with Conley standard errors, using a distance cutoff of 500km (Figure A9). Second, we cluster standard errors by (pre-slave trade) state rather than by settlement (Figure A9).[24] Third, we experiment with different timeframes for the analysis, varying the start date between 700 and 1300 (at 100-year intervals) and the end date between 1900 and 2000 (at 50-year intervals) (Tables A3). Fourth, rather than the conquest of Constantinople, we treat the dissolution of the Golden Horde in 1502 as the starting point of the early modern Black Sea slave trade (Figure A10).

Fifth, the results could reflect raid-induced migration from small towns and villages that are not covered by the European Urban Population database to the more populous settlements that do feature. While this possibility cannot be ruled out, one would not expect people fleeing raids to move disproportionately to *other* raided settlements — unless such settlements were in the process of fortifying themselves, in which case this pattern could be considered evidence for our hypothesized defensive state-building mechanism. Moreover, within the European Urban Population sample, there is no ev-

[23] Figure A8 documents comparable results with Imai, Kim, and Wang's (2023) matching estimator, which pairs treated and untreated units with alike treatment and outcome histories. This approach only yields estimates for a few pre- and posttreatment periods.

[24] Throughout this study, we use historical borders from the Euratlas Historical Political Boundaries of Europe database (Nüssli 2016), correcting a few inaccuracies in the southern Black Sea region and northeastern Russia.

FIGURE 5. Urban Population Analysis: Event Study Results



Notes: Event study estimates of the impact of exposure to nomadic slave raids on the logged population (in thousands) of 550 Eastern European urban settlements over 13 periods between 1100 and 1900. All models include settlement and period fixed effects. Bars represent 95% confidence intervals based on robust standard errors clustered by settlement.

idence that larger raided settlements enjoyed faster population growth than smaller ones during the slave trade. As shown in Table A4, when we interact the treatment indicator with the logarithm of a settlement's population in 1400, the coefficient on the resulting term has mixed signs and mostly falls short of significance. Nor, Figure A11 indicates, were larger settlements more likely to be raided in the first place: population in 1400 is a poor predictor of exposure to raids in every period of the slave trade.

Finally, one might worry that there are time-varying, location-specific factors that affect both raid exposure and population growth. One plausible candidate is regular military conflict, which occurred

throughout the slave trade (though rarely coincided with raids). Figure A12 shows that controlling for the cumulative number of conflicts within various radii of a settlement — measured with the Historical Conflict Event Dataset (Miller and Bakar 2023) — does not alter the results, and that the coefficient on this variable is small and mostly indistinguishable from 0. Another possibility is that, due to climactic and geographical advantages, settlements nearer the Black Sea were more likely to benefit from productive agriculture and trade once Russia annexed them in the 18th century. However, the findings remain intact when we interact period fixed effects (δ_t) with a settlement's (1) longitude, (2) latitude, and (3) state in 1400 (Figure A13).[25]

Extensions

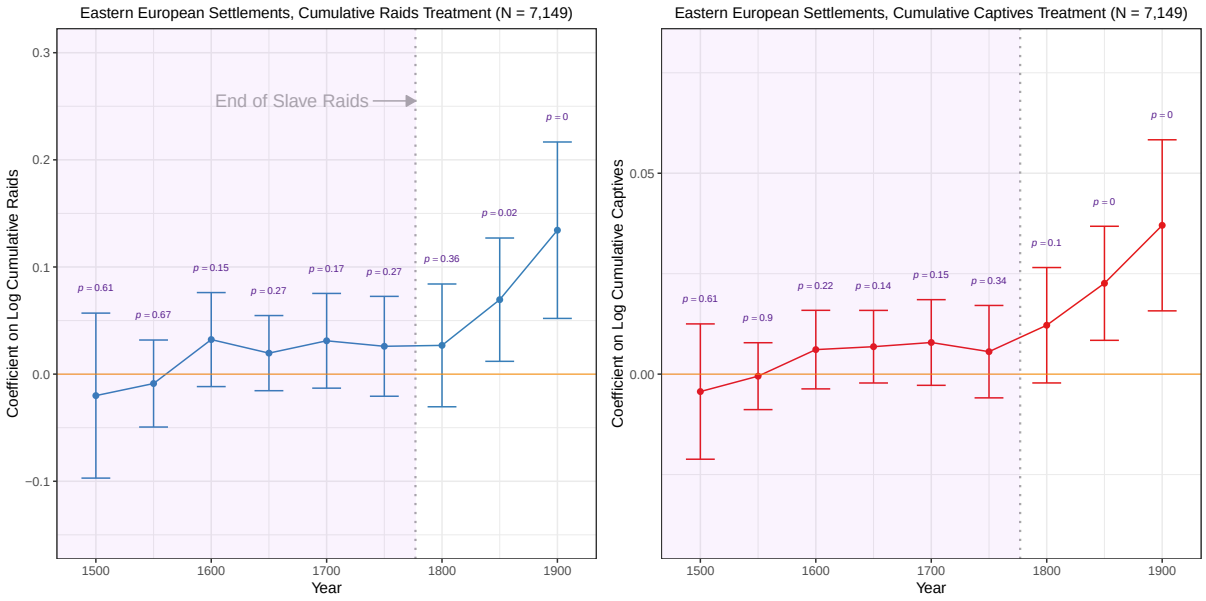
Analyzing Raid Intensity As well as discrete exposure to slave raids, we might wonder how variation in raid intensity impacts a settlement's population. To explore this question, we convert Equation 1 into a continuous difference-in-differences model by replacing R_{st} with the logarithm of cumulative (1) raids on and (2) captives taken from settlement s in period t.[26] The coefficients on these treatments, plotted in Figure 6, evolve in a similar fashion to those on R_{st} (in Figure 4). A 1% rise in cumulative raids, for instance, is associated with a 0.02% decline in settlement population in 1500 (p=0.61), a 0.04% increase in 1700 (p=0.17), and a 0.13% increased in 1900 (p=0.001).

A related question is whether the treatment effect *varies* with raid intensity. In Figure A15, we convert R_{st} into a series of indicators for whether settlement s has been raided once, twice, 3-5 times, 6-10 times, and more than 10 times as of period t. No clear pattern emerges: long-run treatment effects are similar to those in baseline analysis for 1, 2, 6-10, and more than 10 raids but approximately half the size for 3-5 raids.

[25] We round longitude and latitude to the nearest integer to ensure sufficient statistical power.

[26] Difference-in-differences estimators with continuous treatment variables are an active area of research, and there is no clear consensus about the optimal implementation strategy. In Figure A14, we show that the difference between observed and imputed counterfactual values of $\log(P_{st})$ for treated units — as estimated with Liu, Wang, and Xu's (2024) fixed effects counterfactual estimator — is positively related to our continuous treatments, providing evidence for the "strong parallel trends" assumption highlighted by Callaway, Goodman-Bacon, and Sant'Anna (2024).

FIGURE 6. Urban Population Analysis: Continuous Difference-in-Differences Estimates



Notes: Difference-in-differences estimates of the impact of cumulative slave raids (left panel) and captives (right panel) on the population of 550 Eastern European urban settlements observed over 13 periods between 1100 and 1900. All models include settlement and period fixed effects. Bars represent 95% confidence intervals based on robust standard errors clustered by settlement.

Grid Cell Analysis An alternative strategy for addressing concerns about using urban settlements as the unit of observation is to structure our data within a two-dimensional grid of square polygon cells, which are fixed in time and space and hence exogenous to features of interest. We overlay Eastern Europe with the PRIO-GRID (Tollefsen, Strand, and Buhaug 2012), a vector grid network with a resolution of 0.5°×0.5° (roughly 50km×50km at the equator), creating a grid cell-period level dataset containing 3,905 cells and 74,195 observations.[27] We then adapt Equation 1 to the grid cell level, regressing the logarithm of grid cell g's total urban population in period t (P_{gt}) on the interaction between a dummy for whether g has been raided as of t (R_{gt}) and $Post_t$ plus grid cell (ω_g) and period (δ_t) fixed effects; robust standard errors are clustered by grid cell.[28] The results, illustrated in Figure A17, accord with the baseline estimates while providing stronger evidence of a negative initial treatment effect.

[27] The grid is mapped in Figure A16.

[28] Figure A5 shows approximately parallel trends in the mean population of raided and non-raided grid cells prior to the slave trade.

The gridded data format allows us to explore two additional issues of interest. First, does the demographic impact of raids "spill over" to nearby settlements, whether due to migration, trade, or economic agglomeration? When we add an interaction between $Post_t$ and the mean of R_{gt} in all grid cells adjacent to g, the coefficients on this term exhibit a steep upward trajectory, implying sizable spillover effects (Figure A18). The second issue is whether raids increase the density of *settlements* in a given area, which we examine by replacing P_{gt} with the number of settlements in g as of period t with (1) any inhabitants, (2) at least 5,000 inhabitants, and (3) at least 10,000 inhabitants. Again, the results indicate a positive long-run treatment effect (Figure A19).

Alternative Data Sources Finally, the findings survive the use of two alternative sources of data on urban population trends, one covering the whole of Europe (Figure A20) and the other most of Central Eastern Europe (Figure A21). The first is the Database of City Populations from around the World over Time (Biguzzi 2020), which has a comparable geographical and temporal scope to the European Urban Population database but only includes around half as many settlements in Eastern Europe and lacks detailed documentation on sourcing and methodology (or an associated peer-reviewed article).[29] The second is Miller's (2008) dataset on the population of 95 settlements in the Lands of the Bohemian Crown, the Poland-Lithuanian Commonwealth, and the Kingdom of Hungary, which is measured at four points between 1500 and 1650.

Long-Run Development in Imperial Russia and Austria

Identification Strategy

The second stage of our empirical investigation considers a more expansive set of development outcomes available for districts of the Russian and Austrian Empires — which encompass the majority

[29] The mean populations of raided and non-raided settlements in this database again follow roughly parallel trends before the slave trade (Figure A6).

of raided locations — in the mid-19th century.[30] The absence of time-series data on these variables presents new inferential challenges, most notably that the location of slave raids could be endogenous to omitted determinants of development — or to development itself. It should be mentioned, however, that neither our urban population analysis nor historical accounts provide evidence that prosperous locations were a more attractive target for raids; on the contrary, nomads were known to favor poor rural areas with weak defenses (Gliwa 2021, 197).

To address possible endogeneity in the location of raids, we pursue an instrumental variables strategy that leverages natural topographical features affecting districts' accessibility to nomads. Our approach is motivated by two observations. First, a high proportion of raids are clustered around the four nomadic trails mentioned earlier, which originate near Akkerman or Perekop on the northern Black Sea coast and terminate near Lviv or Moscow. Second, these trails closely follow the boundaries between watershed zones in the Black Sea region, thereby enabling nomads to avoid steep slopes, rivers, and marshes and to easily access shelter and grassland (Davies 2007). Building on these patterns and the spatial identification strategies employed by Blaydes and Paik (2021) and Matranga and Natkhov (2022), we develop an algorithm that calculates the geographically most efficient routes — or "least-cost paths" — between the endpoints of each trail. The algorithm's input is a flow accumulation cost raster, a matrix of cells whose values represent the volume of water that drains into a specified rectangular area (which generally increases with gradient and decreases with elevation). After preprocessing the raster to ensure correct projection and efficient computation, we trace the path with the lowest accumulated flow from (1) Akkerman to Lviv, (2) Perekop to Lviv, and (3) Perekop to Moscow.[31] We then construct the next three least-cost paths for each source-destination pair by adding a penalty to cells within 15km of a more efficient path. Finally, for all pairs, we select the three paths that most closely approximate one of the four nomadic trails, yielding a total of nine paths (see Figure 7). We describe the algorithm's steps in more detail in Online Appendix D.

[30] In the 18th century, the Polish-Lithuanian Commonwealth was partitioned, with southern territories incorporated into the Austrian Empire and central and eastern territories into the Russian Empire.

[31] Raiding expeditions into Russia rarely began in Akkerman, which is substantially more distant than Perekop and obstructed by coastal river networks.

FIGURE 7. Least-Cost Raiding Paths and Nomadic Trails

Notes: This map shows that the four principal trails used by nomads to conduct slave raids closely track nine least-cost (i.e., maximally efficient) paths from the northern Black Sea coast to Lviv or Moscow.

A district's proximity to the nine least-cost paths should (inversely) predict its exposure to slave raids with comparable precision to its distance from the four nomadic trails. Since the least-cost paths are constructed solely based on characteristics of the steppe terrain, however, they are more plausibly exogenous to long-run development and its correlates. A key threat to the exclusion restriction is the possibility that these natural features impact development directly, for instance, by facilitating economic exchange or productive agriculture. There is no historical evidence to suggest that the least-cost paths served as a conduit for trade or migration; nor does this possibility seem likely, in light of their remoteness from the major ports serving Polish-Lithuanian and Russian commerce, such as

Gdańsk, Narva, Reval, Riga, and Archangel'sk. At the local level, goods were usually transported via rivers, proximity to which we control for in our instrumental variables specification. We also include measures of terrain ruggedness, soil fertility, temperature, and other climatic and topographical characteristics influencing agricultural potential. Our identifying assumption is that, conditional on such features, a district's distance to the least-cost paths only affects its long-run development through its exposure to raids.

We implement our approach using a two-stage least squares (2SLS) estimator. The first stage models a district's aggregate exposure to raids as a function of its proximity to the least-cost paths plus a battery of controls:

$$\log(R_d) = \varphi_0 + \varphi_1 L_d + \varphi_{\mathbf{X}} \mathbf{X}'_d + \varepsilon_d \tag{3}$$

where R_d is the cumulative number of raids on district d; L_d is d's minimum distance to a least-cost path (in km); and $\mathbf{X}'_d$ is a vector of district-level control variables, which we describe below. In the second stage, we regress a given development outcome on predicted values of R_d from Equation 3 and the same set of controls:

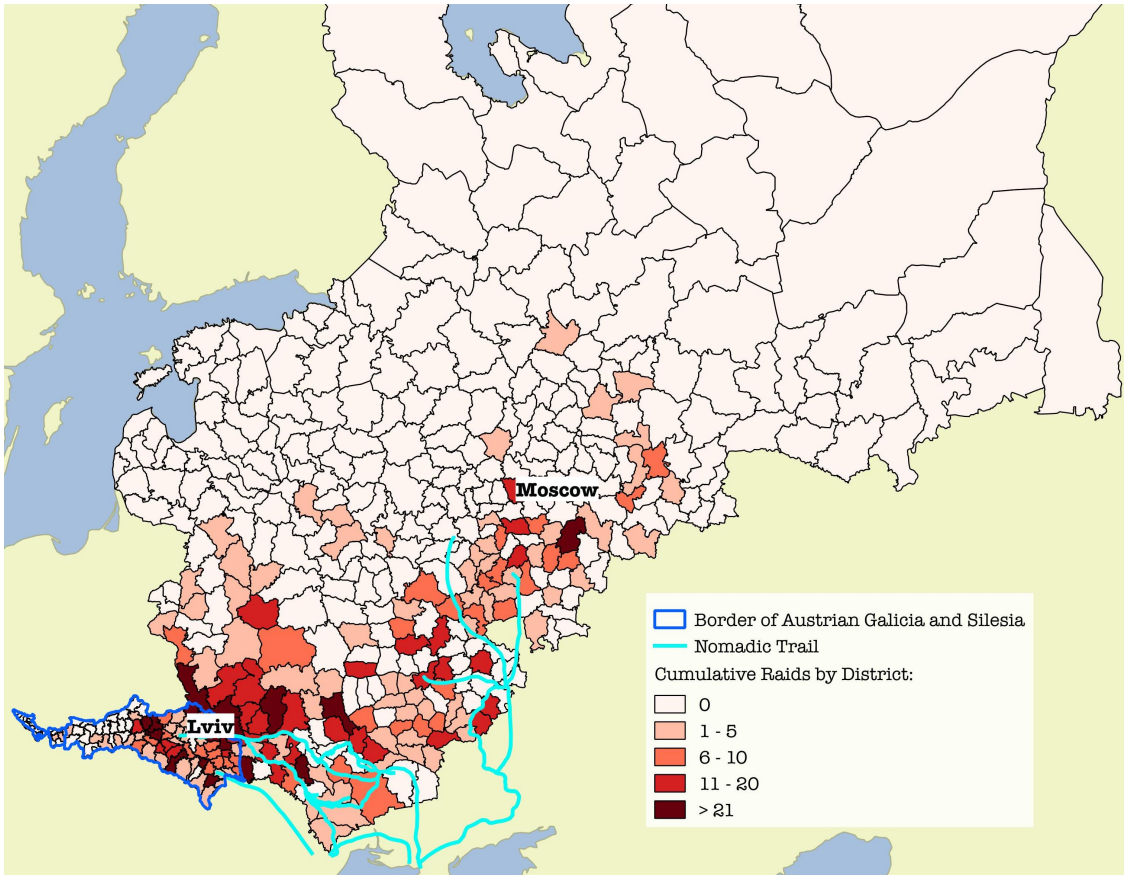
$$Y_d = \alpha + \beta \widehat{\log(R_d)} + \psi_{\mathbf{X}} \mathbf{X}'_d + \gamma_s + \varepsilon_{sd}. \tag{4}$$

If the exclusion restriction holds, β captures the average change in Y_d resulting from a 1% increase in cumulative raids on a district due to its proximity to the least-cost paths.

Analysis of Imperial Russian Districts

We first apply our instrumental variables strategy to districts (*uezdy*) of Imperial Russia. As this state encompassed the former nomadic Khanates of Crimea, Kazan, and Astrakhan, we restrict the analysis to districts within the 1505 borders of Muscovy, Poland, Lithuania, Ryazan, Pskov, and Livonia (see Figure 8) — that is, territory not under nomadic control before the major phase of Russian expansion. Drawing on data collected from imperial statistical volumes and administrative records by Dower et al. (2018), we construct three sets of outcome variables: (1) population, logged urban (1863) and per km^2

FIGURE 8. Distribution of Slave Raids in Imperial Russia and Austrian Galicia and Silesia



Notes: Cumulative slave raids on locations within mid-19th century districts of (1) the Russian Empire, excluding nomadic khanates and non-sovereign territories as of 1505, and (2) Austrian Galicia and Silesia.

(1897); (2) the number of markets (1867), logged and per km^2; and (3) the number of factories (1867), logged and per km^2.

In both estimation stages, we include several district-level controls: mean terrain ruggedness, computed with raster data from Shaver, Carter, and Shawa (2019); average annual precipitation and temperature seasonality, from the WorldClim 2 dataset (Fick and Hijmans 2017); the logarithm of land area (in km^2); minimum distance to a river and to a coastline according to the Natural Earth domain map; distance to Moscow; soil fertility, as per Food and Agriculture Organization (FAO) statistics compiled by Dower et al. (2018); the logarithm of urban population in 1400 — a proxy for pre-slave trade development — which we calculate using the European Urban Population database; and the

cumulative number of regular military conflicts during the slave trade, measured with the Historical Conflict Event Dataset. Since some districts previously lay outside Muscovite territory, we specify state fixed effects with 1505 borders.[32]

Results

Panel A in Table 1 reports second-stage estimates and first-stage F-statistics (bottom row). As indicated by the latter, a district's minimum distance to a least-cost path is a strong negative predictor of its exposure to raids. The second-stage results also bear out expectations. The coefficient on the instrumented measure of cumulative raids is positive for all six development outcomes and statistically significant for five. A 1% rise in aggregate raids is associated with 0.36% more urban inhabitants, 0.52% more markets, and 0.3% more factories; per 100km^2, this translates into additional 14 inhabitants, 0.002 markets, and 0.01 factories.

In Online Appendix D, we confirm that estimating Equation 4 using observed rather than predicted cumulative raids (i.e., substituting OLS for 2SLS) does not materially alter the results (panel A, Table A11). To assess the validity of our instrument, we also conduct a "zero-first stage" placebo test of whether it predicts the outcome in a subsample where it should *not* influence treatment assignment (Lal et al. 2024, 7). Table A12 indicates that the reduced-form effect of minimum distance to a least-cost path on our six development outcomes is null for districts north of Moscow, which nomads could not easily reach during expeditions into Russia, but negative for districts south of Moscow, where this distance strongly predicts raid exposure. Finally, we demonstrate robustness to an alternative instrument that follows a similar logic but involves no path construction: a district's minimum distance to Crimea along a watershed boundary line (panel A, Table A13).

[32] Table A6 in Online Appendix D presents summary statistics for the analysis dataset.

TABLE 1. Slave Raids and Development in Imperial Russia and Austria: Instrumental Variables Estimates

Panel A: Russian Empire						
Outcome:	Population		Markets		Factories	
	Log Urban	Per km^2	Log Total	Per km^2	Log Total	Per km^2
	(1)	(2)	(3)	(4)	(5)	(6)
Log Cumulative Raids	0.363***	13.926***	0.516***	0.002***	0.304	0.005**
(Instrument: Distance	(0.136)	(4.257)	(0.189)	(0.001)	(0.215)	(0.003)
to Least-Cost Paths)	[0.119]	[5.673]	[0.281]	[0.001]	[0.189]	[0.003]
N	358	365	362	362	363	363
Mean Outcome Variable	8.734	42.254	2.163	0.004	2.322	0.007
District-Level Controls	✓	✓	✓	✓	✓	✓
State FEs (1505 Borders)	✓	✓	✓	✓	✓	✓
First-Stage F-Statistic	57.847	57.697	57.519	57.519	58.010	58.010
Panel B: Austrian Galicia and Silesia						
Outcome:	Population		Houses		Farm Structures	
	Log Total	Per km^2	Log Total	Per km^2	Log Total	Per km^2
	(7)	(8)	(9)	(10)	(11)	(12)
Log Cumulative Raids	0.655***	1,025.445***	0.323**	23.901***	0.164*	24.319***
(Instrument: Distance	(0.219)	(346.192)	(0.138)	(8.026)	(0.097)	(8.273)
to Least-Cost Paths)	[0.193]	[235.212]	[0.135]	[7.212]	[0.114]	[7.895]
N	99	99	99	99	99	99
Mean Outcome Variable	10.813	191.673	8.911	14.663	9.277	20.018
District-Level Controls	✓	✓	✓	✓	✓	✓
First-Stage F-Statistic	11.450	11.450	11.450	11.450	11.450	11.450

Notes: 2SLS estimates of the impact of nomadic slave raids, instrumented by minimum distance to nine least-cost paths from the northern Black Sea coast to Lviv and Moscow, on district-level development outcomes in mid-19th century Russia (panel A) and Austrian Galicia and Silesia (panel B). All models control for urban population in 1400, land area, distance to a river and to a coastline, soil fertility, terrain ruggedness, and cumulative military conflicts in 1453-1777; in Panel A, temperature seasonality, precipitation, and distance to Moscow are also included. Robust standard errors in parentheses; Conley standard errors (cutoff = 500km) in brackets. For full first- and second-stage results, see Tables A8-A10 in Online Appendix D. $^*p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

Analysis of Austrian Galicia and Silesia

Another part of Eastern Europe for which rich local development data from the mid-19th century have recently become available is the southern strip of the Polish-Lithuanian Commonwealth annexed by the Austrian Empire in the 18th century. This relatively small and homogeneous area comprised the provinces of Galicia and Silesia, whose 99 districts (*Kreise*) vary markedly in their exposure to slave raids. As shown in Figure 8, both raids and least-cost paths are heavily concentrated in eastern

Galicia.[33] Indeed, there are virtually no raids west of Rzeszów in central Galicia or in the whole of Silesia, making districts within these areas a useful set of control observations.

Using geocoded data collected from censuses, historical maps, and satellite images by Kaim et al. (2021), we construct six outcome variables measuring the density and total number of a district's inhabitants, houses, and farm structures. Following our earlier identification strategy, we regress these measures on the logarithm of cumulative slave raids on a district instrumented by its minimum distance to a least-cost path. In both stages of the 2SLS specification, we include a similar set of controls to the Russia analysis: mean terrain ruggedness; logged minimum distance to a river and to a coastline; soil fertility; logged urban population in 1400; logged land area; and cumulative military conflicts in 1453-1777.[34]

Results

The results are presented in Panel B of Table 1. As indicated by the first-stage F-statistics (bottom row), distance to the least-cost paths is again strongly and negatively related to raid exposure. Similarly to before, the second-stage estimates reveal a positive and significant relationship between the instrumented treatment and all six development indicators. A 1% increment in cumulative raids raises a district's population by 0.66%, its housing stock by 0.32%, and its number of farm structures by 0.16%; per 100km^2, this amounts to 1,025 more inhabitants, 24 more houses, and 24 more farm structures. Once more, the estimates are robust both to using observed rather than predicted treatment values (panel B, Table A11) and to instrumenting cumulative raids with distance to Crimea along a watershed boundary (panel B, Table A13).

[33] For a more detailed illustration of this pattern, see Figure A22 in Online Appendix D.

[34] Weather variables are omitted due to the small size (and hence narrow latitudinal range) of Galicia and Silesia. For summary statistics, see Table A7 in Online Appendix D.

The Defensive State-Building Mechanism

What explains the positive association between exposure to slave raids and long-run development in Eastern Europe? As mentioned in the theoretical discussion, there is substantial descriptive evidence linking the economic impetus delivered by raids to efforts by rulers and local elites to strengthen defensive infrastructure, centralize administration, and consolidate fiscal systems. In terms of observable implications, if this mechanism is accurate, we should expect raided areas to develop (1) more robust defensive structures and (2) higher levels of bureaucratic, military, and fiscal capacity. We probe each implication in turn.

Fortification Construction We analyze the impact of raid exposure on fortification construction using a modified version of the grid cell-level difference-in-differences strategy described in our urban population examination. Building on Adamczyk (2004), we assemble and geocode data on the presence of (1) major castles or citadels, (2) small castles or fortified manors, (3) fortified towns, (4) fortified villages, and (5) fortified churches in southern provinces of Poland-Lithuania between the medieval period and the end of the 18th century (mapped in Figure A24, Online Appendix E). As available construction dates are imprecise, we compute the density of each type of fortification per grid cell g at century intervals between 1100 and 1800, focusing on the approximately rectangular (2,000km$\times$1,500km) polygon studied by Adamczyk.[35] We then regress these measures on R_{gt}, grid cell fixed effects (ω_g), and period fixed effects (δ_t), clustering robust standard errors by grid cell.

The results are reported in Table 2. Exposure to raids has a positive and highly significant association with the density of all five fortification types (columns 1-5) as well as an aggregate measure that sums the previous five and adds upgrades to existing fortifications (column 6). On average, raided grid cells saw the construction of 1.36 more major castles, 0.48 more small castles, 0.88 more fortified towns, 0.05 more fortified villages, 0.35 more fortified churches, and 3.68 more fortifications of any

[35] Where possible, we supplement dates provided by Adamczyk with information from historical sources on raids in Poland-Lithuania (see Table A1, Online Appendix A).

TABLE 2. Slave Raids and Fortification Construction in Poland-Lithuania: Difference-in-Differences Estimates

Outcomes: # per Grid Cell of...	Major Castles (1)	Small Castles (2)	Fortified Towns (3)	Fortified Villages (4)	Fortified Churches (5)	Any Type of Fortification (6)
Grid Cell Raided	1.363***	0.475***	0.879***	0.051***	0.346***	3.678***
	(0.147)	(0.093)	(0.099)	(0.016)	(0.063)	(0.411)
	[0.211]	[0.142]	[0.187]	[0.000]	[0.093]	[0.497]
N	4,896	4,896	4,896	4,896	4,896	4,896
R^2	0.556	0.429	0.517	0.371	0.499	0.526
Mean Outcome Variable	0.269	0.087	0.173	0.008	0.069	0.700
Grid Cell FEs	✓	✓	✓	✓	✓	✓
Period FEs	✓	✓	✓	✓	✓	✓

Notes: Difference-in-differences estimates of the impact of nomadic slave raids on the construction of permanent fortifications in southern provinces of the Polish-Lithuanian Commonwealth over eight periods from 1100 to 1800 at the grid cell (0.5°×0.5°) level. Robust standard errors, clustered by grid cell, in parentheses; Conley standard errors (distance cutoff = 500km) in brackets. $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

kind. Table A14 in Online Appendix E shows that these estimates are robust to limiting the analysis to different subsets of Adamczyk's map and to earlier periods of the slave trade.

Military, Administrative, and Fiscal Capacity Our second analysis examines how exposure to slave raids influenced defensive state capacity in Russia using the instrumental variables strategy described in the previous section. We construct two sets of outcome variables, one measured in the 17th and early 18th centuries and the other in the late 19th century. For the first set, we digitized and geocoded census statistics gathered by Vodarskii (1966) on the population of 194 urban communities with the right to conduct commerce or industry (*posads*), which were surveyed at four intervals between 1646 and 1722 (see Figure A25 in Online Appendix E for a map).[36] We replace the outcome in Equation 4 with five variables: the logarithm of tax-paying traders and artisans (*posadkie*) at (1) the household (*dvor*) level in 1650 and (2) the individual level in 1678-79;[37] and the logarithm of military and state servicemen (*sluzhilye*) at the household level in (3) 1646 and (4) 1678-79 and (5) the individual

[36] Summary statistics are available in Table A15, Online Appendix E. Not all *posads* were surveyed in each census.

[37] The *dvor*, the basic unit of taxation in Russia, was understood to encompass one property, including owners and servants.

TABLE 3. Slave Raids and Defensive State Capacity in Russia: Instrumental Variables Estimates

Panel A: Urban Community Level, 1646-1722					
Outcome:	Log Military/State Officials		Log Traders and Artisans		
	Households (1650)	Individuals (1678-79)	Households (1646)	Households (1678-79)	Households (1722)
	(1)	(2)	(3)	(4)	(5)
Log Cumulative Pre-Outcome Raids (Instrument: Distance to Least-Cost Paths)	1.034**	1.469***	-1.215***	-0.738***	-0.589**
	(0.425)	(0.311)	(0.398)	(0.247)	(0.257)
	[0.086]	[0.253]	[0.094]	[0.109]	[0.140]
N	108	110	133	157	175
Mean Outcome Variable	4.857	5.045	4.644	4.806	6.209
Community-Level Controls	✓	✓	✓	✓	✓
Within Muscovy (1505 Borders)	✓	✓	✓	✓	✓
First-Stage F-Statistic	23.880	60.349	37.391	74.367	68.789

Panel B: District Level, 1890s					
Outcome:	State Officials (1897)		Military Officials (1897)		Arrears (1892-95)
	Per 1k Pop.	Per km^2	Per 1k Pop.	Per km^2	/Tax Owed
	(6)	(7)	(8)	(9)	(10)
Log Cumulative Raids (Instrument: Distance to Least-Cost Paths)	-0.031	0.006***	0.116**	1.798**	-0.188*
	(0.060)	(0.002)	(0.049)	(0.879)	(0.111)
	[0.067]	[0.002]	[0.051]	[1.079]	[0.184]
N	357	357	357	357	365
Mean Outcome Variable	0.482	0.015	0.072	1.497	0.379
District-Level Controls	✓	✓	✓	✓	✓
State FEs (1505 Borders)	✓	✓	✓	✓	✓
First-Stage F-Statistic	52.476	52.476	52.476	52.476	55.687

Notes: 2SLS estimates of the impact of slave raids, instrumented by minimum distance to nine least-cost paths from the northern Black Sea coast to Lviv and Moscow, on defensive state capacity in Russian urban communities from 1646 to 1722 (panel A) and imperial districts in the 1890s (panel B). The community-level controls are minimum distance to a river and to a coastline, age, and distance to Moscow; the district-level controls are the same as in panel A of Table 1. Robust standard errors in parentheses; Conley standard errors (cutoff = 500km) in brackets. For full results, see Tables A16 and A17, Online Appendix E. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$.

level in 1722.[38]

As the dataset covers a central period of the slave trade, we expect raid exposure to be positively associated with a *posad*'s contingent of military and state officials but — unlike in the long run — negatively associated with its population of traders and artisans. The results, presented in panel A of Table 3, comport with these expectations across all five outcomes. At the household level, for example, a 1% rise in cumulative raids lifts the number of *sluzhilye* by 1% but reduces the number of *posadkie* by

[38] Raids that occurred after these variables are measured are naturally excluded from the treatment.

0.6-1.2%.

The second set of outcomes furnish a longer-run test of our hypothesized mechanism, capturing the strength of district-level administrative, military, and fiscal systems in the late imperial period. We digitize occupational statistics from the 1897 Russian census to create two measures of bureaucratic density and two measures of military presence: the number of government officials per 1,000 population and per km^2; and the number of military personnel per 1,000 population and per km^2. To gauge fiscal capacity, we divide a district's state tax arrears by its total tax burden (all in rubles) averaged from 1893 to 1895, which we digitized from the statistical annals of Russia's Ministry of Finance (1902).

As shown in panel B of Table 3, more intensely raided districts boasted significantly more state officials per km^2 (though not per capita), more armed forces per capita and per km^2, and smaller tax arrears. The treatment effect is particularly large for the last indicator, with a 1% increase in cumulative raids reducing a district's proportion of unpaid taxes by 18.8%. In sum, the results are consistent with the notion that exposure to slave raids catalyzed a process of defensive state-building that bolstered local bureaucratic, military, and fiscal capacity over time.

Conclusion

Despite its massive human toll and profound impact on the political and economic organization of a major geographical region over more than three centuries, the early modern Black Sea slave trade has received scant attention from social scientists. This is particularly surprising in light of its structural differences from the transatlantic slave trade, the main source of existing knowledge on how slave-raiding influences long-run development: raided states in Eastern Europe sought to neither integrate into nor gain advantage from the slave trade, suppressing slavery within their borders while pursuing alternative export opportunities that made intensive use of labor. We have argued that these differences fundamentally altered how Eastern European rulers and elites responded to raids, incentivizing them to pursue a strategy of defensive state-building that, over the long run, created favorable conditions for trade, investment, and settlement in affected areas.

We have sought to evaluate this hypothesis by assembling and examining the most comprehensive dataset on early modern slave raids in Eastern Europe. As well as painting a more precise geographical, temporal, and demographic picture of Eastern European slavery, the data revealed a strong positive association between exposure to raids and a host of long-run development outcomes. Using a difference-in-differences design, we began by showing that raided urban settlements exhibited faster population growth over the early modern period than non-raided settlements — particularly once the slave trade ended — uncovering some evidence of an initial demographic decline in the subset founded before the slave trade. Leveraging a spatial instrumental variables strategy, we then found that more intensely raided districts of the Russian and Austrian Empires performed better on several additional development indicators from the mid-19th century, including market, factory, building, and population density. Lastly, we probed the plausibility of our posited defensive state-building mechanism, providing evidence that raid exposure boosted fortification construction in Poland-Lithuania as well as bureaucratic, military, and fiscal capacity in Russia.

The implications of our findings extend beyond Eastern Europe — and indeed West Africa. Transnational systems of commercial slavery have, at some point in history, arisen in almost every corner of the globe (Sharman and Zarakol 2024). The Eastern European case suggests that the developmental consequences of such systems are contingent upon the structure of slave markets, in particular the extent to which slavery supply chains are supported by and embedded in local economic and social institutions. Even setting aside the transatlantic and Black Sea slave trades, structures of slave production appear to have varied widely across regions and over time. In the early modern era, for example, slaves were procured from the Mediterranean basin, North Africa, and Central Asia, which often resisted and pursued defensive strategies against raiding activity, as well as from East Africa and Southeast Asia, where many local economies were built upon and sustained by slavery (Eltis and Engerman 2011). We believe that a systematic investigation of slave production in these and other raided societies could yield important insights into the determinants of long-run differences in development, state capacity, and other significant political and economic outcomes.

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Online Appendices for:

Consequences of the Black Sea Slave Trade: Long-Run Development in Eastern Europe

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Contents

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A Slave Raids Dataset

A.1 Main Sources

TABLE A1. Main Data Sources for Slave Raids Dataset

Author	Title	Translation	Year	Source Type	Language	Coverage	Publication Information
Adamczyk, Jan L.	Fortyfikacje stałe na polskim przedmurzu od połowy XV do końca XVII wieku	Permanent Fortifications on the Polish Outskirts from the Mid-15th to the End of the 17th Century	2004	Secondary	Polish	C15-C17	Kielce: Wydawnictwo Politechniki Świętokrzyskiej
Alekberli, Mamedkesir A.	Борьба украинского народа против турецко-татарской агрессии во второй половине XVI - первой половине XVII веков	The Struggle of the Ukrainian People against the Turkish-Tatar Aggression in the Second Half of the 16th Century - First Half of the 17th Century	1961	Secondary	Russian	C16-C17	Saratov
Alekseev, Yuri G.	Освобождение Руси от ордынского ига.	The Liberation of Rus' from the Yoke of the Golden Horde	1989	Secondary	Russian	C15	Leningrad: Nauka
Alishev, Salyam H.	Болгаро-казанские и золотоордынские отношения в XIII–XVI вв	The Volga Bulgars' Relations with the Kazan Khanate and Golden Horde in the 13th-16th Centuries	2009	Secondary	Russian	C15-C16	Kazan: Tatarskoe Knijnoe Izdatelstvo
Alishev, Salyam H.	Казань и Москва: межгосударственные отношения в XV - XVI вв	Kazan and Moscow: Interstate Relations of the 15th–16th Centuries	1995	Secondary	Russian	C15-C16	Kazan: Tatarskoe knizhnoe Publ.
Andreev, Alexander	История Крыма: краткое описание прошлого Крымского полуострова	History of Crimea: A Brief Description of the Past of the Crimean Peninsula	1997	Secondary	Russian	C15-C18	Moscow: Interregional Center for Industrial Informatics of Gosatomnadzor of Russia
Antonovych, Volodymyr B.	История Галицкой Руси	History of Galician Russia	1879-1880	Secondary	Russian	C15-C18	Kyiv
Bagalei, Dmitry I.	Очерки из истории колонизации и быта степной окраины Московского государства	Essays on the History of Colonization and the Life on the Steppe Outskirts of Muscovy	1886	Secondary	Russian	C17	Moscow: Imperial Society of Russian History and Antiquities
Baiov, Alexey K.	Русская армия в царствование императрицы Анны Иоанновны. Война России с Турцией в 1736-1739гг.	The Russian Army in the Reign of Empress Anna Ioannovna: The War between Russia and Turkey, 1736-1739	1906	Secondary	Russian	C18	St. Petersburg
Baranowski, Bohdan	Chłop polski w walce z Tatarami	Polish Peasants in the Fight against the Tatars	1952	Secondary	Polish	C15-C16	Warsaw: Ludowa Spółdzielnia Wydawnicza
Baranowski, Bohdan	Polska a Tatarszczyzna w latach 1624–1629	Poland and the Tatar Region in the Years 1624–1629	1948	Secondary	Polish	C17	Łódź: Łódzkie Towarzystwo Naukowe
Bazak, Jacek	Wspomnienia Kasi Kolasy jako przyczynek do opisu najazdu tatarskiego podczas wojny polsko-tureckiej w 1672 roku	Memoires of Kasia Kolasa As A Contribution to the Description of the Tartar Invasion during the Polish-Turkish War in 1672	2005	Primary: memoir	Polish	C17	Rocznik Stowarzyszenia Miłośników Jarosławia [Yearbook of the Enthusiasts Association of Jarosław] 16: 35–47
Benningsen, Aleksander et al. (eds.)	Le Khanat de Crimée dans les Archives du Musée du Palais de Topkapı	The Crimean Khanate in the Archives of the Topkapı Palace Museum	1978	Primary: diplomatic documents	French (trans.)	C15-C18	Paris: Mouton
Berezhkov, Mikhail N.	Русские пленники и невольники в Крыму	Russian Captives and Slaves in the Crimea	1888	Secondary	Russian	C16	In: *Тр. VI Археол. съезда в Одессе*, 2: 342-372
Bespalov, Roman A.	Хан Улу-Мухаммед и государства Восточной Европы: от Белёва до Казани (1437-1445)	Khan Ulu-Muhammad and the States of Eastern Europe: From Belev to Kazan (1437–1445)	2012	Secondary	Russian	C15	*Золотоордынская цивилизация* 5: 53–70
Bielski, Marcin	Kronika polska Marcina Bielskiego	Marcin Bielski's Polish Chronicle	1597	Primary: chronicle	Polish	C15-C16	Kraków

Bielski, Marcin and Joachim Bielski	Dalszy ciąg Kroniki polskiej, zawierającéjdzieje od 1587 do 1598 r.	Continuation of the Polish Chronicle, Containing Stories from 1587 to 1598	1851	Primary: chronicle	Polish	C16	Warsaw
Bilous, Natalia	Kyiv naprykintsi XV – u pershiy polovyni XVII st. Mis'ka vlada I samovryaduvannya	Kyiv at the End of the 15th Century- First Half of the 17th Century: City Government and Self-Government	2008	Secondary	Ukrainian	C15-C18	Kyiv: Kyiv-Mohyla Academy Publishing House
Bobrov, Leonid A.	Тактическое искусство крымских татар и ногаев конца XV – середины XVII вв.	Tactical Art of the Crimean Tatars and Nogais of the Late 15th - Mid-17th Centuries	2016	Secondary	Russian	C15-C17	История военного дела: исследования и источники, Special Issue 5 (2): 210-388
Bobrovsky, Pavel O.	История 13-го Лейб-Гренадерского Эриванского Его Величества полка за 250 лет	History of His Majesty's 13 Life Grenadier Yerevan Regiment for 250 Years	1892-8	Secondary	Russian	C18	St. Petersburg
Borisov, Nikolay	Иван III	Ivan III	2006	Secondary	Russian	C15-C16	Moscow: Molodaya Gvardiya
Broniovius, Martinus	Tartariae Descriptio	Description of Tartary	1595	Primary: travelogue	Latin	C16	Cologne
Broniovius, Martinus	Opisanie Kryma	Description of Crimea	1867	Primary: travelogue	Latin	C16	*Zapiski Odesskogo obščestva istorii i drevnostej* 6: 333–367
Bylinski, Janusz	Naiazd Tatarski na Wołyń w 1593 roku na tle innuch najazdów wo XVI wieku	The Tatar Invasion of Volhynia in 1593 against the Background of Other Invasions in the 16th Century	2001	Secondary	Polish	C1593	In: *Aere Perennius: Profesorowi Gerardowi Labudzie dnia 28 XII 2001 roku w hołdzie*, eds. Marceli Kosman and Antoni Czubiński, Poznań, pp. 115-129
Çelebi, Evliya	Seyahatname	Travel Book	1896-1935	Primary: travelogue	Turkish	C17	Istanbul
Čerkas, Borys	Ukrajina v polityčnyx vidnosynax Velykoho knjazivstva Lytovs'koho z Kryms'kym xanatom (1515-1540)	Ukraine in the Political Relations of the Grand Duchy of Lithuania with the Crimean Khanate	2006	Secondary	Ukrainian	C16	Kyiv
Czapliński, Władysław	Sprawa najazdów tatarskich na Polskę w pierwszej połowie XVII w.	The Case of the Tatar Invasions of Poland in the First Half of the 17th century	1963	Secondary	Polish	C17	*Kwartalnik Historyczny* 70 (3): 713-720
Czołowski, Aleksander	Polska a Tatarszczyzną Stan badań i dezydyraty	Poland and the Tatar Region: The State of Research and Desiderata	1925	Secondary	Polish	C15-C18	In: *Memoirs of the 4th Congress of Polish Historians in Poznań*, December 6-8 , Vol. I, Lviv
Czołowski, Aleksander	Najazd Tatarów na Lwów w 1695 r.	Tatar Invasion of Lviv in 1695	1902	Secondary	Polish	C17	Lviv: Drukarnia Narodowa
Davies, Brian L.	Warfare, State and Society on the Black Sea Steppe 1500-1700		2007	Secondary	English	C16-C18	Abingdon: Routledge
de Hurmuzaki, Budoxiu	Documente privitore la istoria românilor	Documents Regarding the History of the Romanians	1891-1897	Primary: legal, diplomatic documents	Romanian	C15-C18	Bucharest
de Beauplan, Guillaume L.V.	Description d'Ukranie	Description of Ukraine	2002 [C17]	Primary: travelogue	French	C16	L'Harmattan
de Peyssonel, Charles	An Appendix to the Memoires of Baron de Tott		1786	Primary: memoir	English (trans.)	C18	London
de Tott, François	Memoirs of Baron de Tott, Including the State of the Turkish Empire and the Crimea, during the Late War with Russia		1786	Primary: memoir	English (trans.)	C18	London: G. G. J. and J. Robinson
Deák, Farkas	Okiratok a török-tatár rabok történetéhez	Documents on the History of Turkish-Tatar Prisoners	1886	Primary: military records	Hungarian	C17	*Történelmi Tár* 3 (9): 110-126
Długosz, Jan	Liber Beneficiorum Dioecesis Cracoviensis	Book of Benefice of the Diocese of Cracow	1863 [C15]	Primary: property register	Latin	C15	Cracow
Długosz, Jan	Historiae Polonicae Libri XII	Polish Histories in Twelve Books	1711-12	Primary: chronicle	Latin	C15	Leipzig: Sumptibus Ioannis Ludovici Gleditschii

Dziubiński, Andrzej	Stosunki dyplomatyczne polsko-tureckie w latach 1500–1572 w kontekście międzynarodowym	Polish-Turkish Diplomatic Relations in the Years 1500–1572 in the International Context	2005	Secondary	Polish	C16	Wrocław: Wydawnictwo Uniwersytetu Wrocławskiego
Dziubiński, Andrzej	Handel niewolnikami polskimi i ruskimi w Turcji w XVI wieku i jego organizacja	Trade in Polish and Russian Slaves in Turkey in the 16th Century and its Organization	1963	Secondary	Polish	C16	*Zeszyty Historyczne Uniwersytetu Warszawskiego* 3: 36-49
Ernst, Nikolaus	Die Beziehungen Moskaus zu den Tataren der Krym unter Ivan III. und Vasilij III., 1474-1519	Moscow's Relations with the Tatars of Crimea under Ivan III and Vasily III, 1474-1519	1911	Secondary	German	C15-C16	PhD Dissertation, Friedrich-Wilhelms-Universität zu Berlin
Fisher, Alan W.	Muscovy and the Black Sea Slave Trade		1972	Secondary	English	C15-C17	Canadian-American Slavic Studies 6 (4): 575-594
Galenko, Oleksandr I.	Про татарські набіги на українські землі	About Tatar Raids on Ukrainian Lands	2003	Secondary	Ukranian	C15-C18	*Український історичний журнал* 6: 52-68
Gawęda, Marcin	Wojskowość tatarska w XVII wieku	Tatar Military in the 17th Century	2009	Secondary	Polish	C17	*Rocznik Przemyski* 45 (1): 121–44
Ghimpu, Vlad	Biserici şi mănăstiri medievale în Basarabia	Medieval Churches and Monasteries in Bessarabia	2000	Secondary	Romanian	C16	Chişinău: Editura Tyragetia
Gliwa, Andrzej	Kraina upartych niepogód: Zniszczenia woienne na obszarze ziemi przemyskiej w XVII wieku	The Land of Stubborn Weather: War Damage in the Area of Przemyśl in the 17th Century	2013	Secondary	Polish	C17	Przemyśl
Gliwa, Andrzej	How Captives Were Taken: The Making of Tatar Slaving Raids in the Early Modern Period		2022	Secondary	English	C15-C18	In: *Slavery in the Black Sea Region, c.900-1900: Forms of Unfreedom at the Intersection between Christianity and Islam*, ed. Felicia Roşu, Leiden: Brill
Gliwa, Andrzej	The Tatar Military Art of War in the Early Modern Period: An Example of Asymmetric Warfare		2016	Secondary	English	C15-C18	*Acta Poloniae Historica* 114: 191-229
Gliwa, Andrzej	The Tatar-Cossack Invasion of 1648: Military Actions, Material Destruction and Demographic Losses in the Land of Przemyśl		2012	Secondary	English	C17	*Acta Poloniae Historica* 105: 85-120
Gliwa, Andrzej	O wojskowości tatarskiej w epoce nowożytnej i oddziaływaniu koczowników na osiadłe społeczności Rzeczypospolitej	The Tatar Military in the Modern Era, and the Impact of Nomads on Sedentary Societies of the Polish-Lithuanian Commonwealth	2015	Secondary	Polish	C16-C17	In: *Społeczeństwo a wojsko*, eds. Iwona Dacka-Górzyńska et al., Warszawa: Wydawnictwo DiG, 2015, pp. 89–133
Gliwa, Andrzej	Najazd tatarsko-kozacki na Ruś Czerwoną w 1648 r. Straty materialne i demograficzne na terenie ziemi przemyskiej	Tatar-Cossack Invasion of Red Ruthenia in 1648: Material and Demographic Losses in the Przemyśl Region	2009	Secondary	Polish	C17	*Rocznik Przemyski* 45 (1): 3-120
Gökbilgin, Özalp	1532-1577 yılları arasında Kırım Hanlığı'nın siyasi durumu	Political Situation of the Crimean Khanate between 1532 and 1577	1973	Secondary	Turkish	C16	Ankara: Sevinç Matbaası
Gökbilgin, Özalp	Tarih-i Sahib Giray Han	History of Sahib Giray Khan	1973	Secondary	Turkish	C16	Ankara: Baylan Matbaası
Golobutsky, Vladimir A.	Запорожское казачество	Zaporozhian Cossacks	1957	Secondary	Russian	C15-C18	Kyiv
Górka, Olgierd	Liczebność Tatarów krymskich i ich wojsk	Number of Crimean Tatars and Their Troops	1936	Secondary	Polish	C15-C18	*Przegląd Historyczno-Wojskowy* 8 (2): 185–295
Grabyanka, Grigory	Літопис гадяцького полковника Григорія Граб'янки	Chronicle of Gadyach Colonel Grigory Grabyanka	1853	Primary: chronicle	Ukranian	C17-C18	Kyiv
Guagnini, Alexander	Sarmatiae Europeae descriptio	Description of European Sarmatia	1578	Primary: description	Latin	C16	Kraków
Herburt de Fulstin, Johannes	Chronica sive historiae polonicae compendiosa descriptio	A Chronicle or Summary of Polish History	1571	Primary: chronicle	Latin	C16	Basel: Joannes Oporinus
Herbst, Stanisław	Kleck 1506		1934	Secondary	Polish	C16	*Przegląd Historyczno-Wojskowy* 7 (1): 21-38
Herbst, Stanisław	Najazd tatarski 1512	Tatar Invasion 1512	1948	Secondary	Polish	C16	*Przegląd Historyczny* 37: 218-226

Horn, Maurycy	Chronologia i zasięg najazdów tatarskich na ziemie Rzeczypospolitej Polskiej w latach 1600-1647	Chronology and Range of Tatar Raids on the Lands of the Republic of Poland in the Years 1600-1647	1963	Secondary	Polish	C17	Warsaw
Horn, Maurycy	Skutki ekonomiczne majazdow tatarskich z lat 1605-1633 na rus czerwona	The Economic Effects of the Tatar Invasions of 1605-1633 on Red Ruthenia	1964	Secondary	Polish	C17	Wrocław: National Institute of the Ossoliński Family
Hrushevsky, Mykhailo	Історія України-Руси	History of Ukraine-Rus'	1997-2014	Secondary	English (trans.)	C16-C17	Edmonton, Toronto: Canadian Institute of Ukrainian Studies Press
Inalcik, Halil and Donald Quataert	An Economic and Social History of the Ottoman Empire, Vol. 1: 1300-1600		1994	Secondary	English	C15-C17	Cambridge: Cambridge University Press
Inglot, Marek	Misjonarze jezuiccy na Krymie od początku XVII do połowy XVIII wieku	Jesuit Missionaries in Crimea from the Beginning of the 17th to the Mid-18th Century	2004	Secondary	Polish	C17-C18	In: *Polacy na Krymie*, ed. Edward Walewander, Lublin, pp. 177–204
Iván, Nagy	Rédei László történeti maradványai 1658–1663	Historical Remains of László Rédei of the Hungarian Historical Museum, 1658-1663	1871	Secondary	Hungarian	C17	Budapest: Magyar Tudományos Akadémia Történelmi Bizottsága
Ivanics, Mária	Enslavement, Slave Labour and the Treatment of Captives in the Crimean Khanate		2007	Secondary	English	C15-C18	In: *Ransom Slavery along the Ottoman Borders*, eds. Géza Dávid and Pál Fodo, Leiden: Brill, pp. 193–219
Ivanics, Mária	Tatár kémszolgálat az 1663-as magyarországi hadjáraton	The Tatar Intelligence Service during the Hungarian Campaign of 1663	1999	Secondary	Hungarian	C17	In: *Információáramlás a magyar és török végvári rendszerben*, eds. Tivadar Petercsák and Mátyás Berecz, Eger: Dobó, pp. 207-227
Jabłonowski, Stanisława	Diariusz napadu tatarskiego w r. 1692	Diary of the Tatar Attack of 1692	1890	Primary: diary	Polish	C17	*Kwartalnik Historyczny* 4: 287–91
Kalinina, E. V.	История города Воронежа	History of the City of Voronezh	1941	Secondary	Russian	C17	Voronezh
Karamzin, Nikolay M.	История государства Российского	History of the Russian State	1816-29	Secondary	Russian	C15-C17	St. Petersburg
Kargalov, Vadim V.	На степной границе :Оборона «Крымской Украины» Русского государства в первой половине XVI столетия	On the Steppe Border: The Russian State's Defense of "Crimean Ukraine" in the First Half of the 16th Century	1974	Secondary	Russian	C16	Moscow: Nauka
Karpov, Gennadij F. (ed.)	Памятники дипломатических сношений Московского государства с Крымскою и Нагайскою ордами и с Турцией	Memorabilia of Diplomatic Relations of Muscovy with the Crimean and Nogai Hordes and with Turkey	1895	Primary: diplomatic documents	Russian	C15-C16	Vol. 41, Collection of the Imperial Russian Historical Society, St. Petersburg
Kemény, János	Kemény János önéletírása	Autobiography of János Kemény	1856	Primary: auto-biography	Hungarian	C17	Budapest
Khodarkovsky, Michael	Russia's Steppe Frontier: The Making of a Colonial Empire, 1500-1800		2002	Secondary	English	C16-C18	Bloomington, IN: Indiana University Press
Kireev, F.N. et al.	Казахско-русские отношения в XVI-XVIII веках	Kazakh-Russian Relations in the 16th-17th Centuries	1961	Primary: diplomatic documents	Russian	C16-C17	Alma-Ata: Akademiya nauk Kazakh SSR
Kizilov, Mikhail	Polish Slaves and Captives in the Crimea in the Seventeenth Century		2020	Secondary	English	C17	*Acta Orientalia Academiae Scientiarum Hungaricae* 73 (2): 253-267.
Kizilov, Mikhail	Slave Trade in the Early Modern Crimea from the Perspective of Christian, Muslim, and Jewish Sources		2007	Secondary	English	C15-C18	*Journal of Early Modern History* 11 (1-2): 1-31
Kocowski, Bronisław	Wyprawa Tatarów na Węgry przez Polskę w 1594 r.	The Tatar Expedition to Hungary through Poland in 1594	1948	Secondary	Polish	C16	Lublin: Towarzystwo Naukowe KUL
Kolankowski, Ludwik	Dzieje Wielkiego Księstwa Litewskiego za Jagiellonów, Tom 1, 1377–1499	History of the Lithuanian Grand Principality under the Jagiellons, Vol. 1, 1377–1499	1930	Secondary	Polish	C15	Warsaw: Kasa im. Mianowskiego
Kolankowski, Ludwik	Obrona Rusi za Jadiellonów na przełomie XV i XVI wieku	Defense of Ruthenia under the Jagiellons at the Turn of the 15th and 16th Centuries	1916	Secondary	Polish	C15-C16	In: *Memorial Book in Honor of Bolesław Orzechowicz*, Vol. 1, Lviv: pp. 466-480

Kolankowski, Ludwik	Roty koronne na Rusi i Podolu: 1492-1572	Crown Troops in Ruthenia and Podolia, 1492–1572	1935	Secondary	Polish	C15-C16	*Ziemia Czerwieńska* 1: 141–174
Kołodziejczyk, Dariusz	The Crimean Khanate and Poland-Lithuania: International Diplomacy on the European Periphery (15-18th Century)		2011	Primary: diplomatic documents	English	C15-C18	Leiden: Brill
Kołodziejczyk, Dariusz	Ottoman-Polish Diplomatic Relations (15th-18th Century): An Annotated Edition of 'Ahdnames and Other Documents		2000	Primary: diplomatic documents	English (trans.)	C16-C18	Leiden: Brill
Koneczny, Feliks	Sprawy z Mengli-Girejem 1473–1504	Relations with Mengli-Giraj, 1473–1504	1927	Secondary	Polish	C15-C16	*Ateneum Wileńskie* 4: 138-189
Konissky, Gregory I.	История Русов или Малой России	History of the Rus'or Little Russia	1846	Secondary	Russian	C15-C18	Moscow: University Printing House
Konopczyński, Władysław	Polska a Turcja 1683-1792	Poland and Türkiye 1683-1792	1936	Secondary	Polish	C17-C18	Warsaw: Instytut Wschodni w Warszawie
Korzon, Tadeusz	Dzieje wojen i wojskowości w Polsce	History of Wars and Military in Poland	1923	Secondary	Polish	C16	Warsaw
Kraus, Georg	Erdélyi krónika 1608–1665	Transylvanian Chronicle 1608–1665	1994	Primary: chronicle	Hungarian	C17	Budapest: OKTK
Król, Kazimierz	Tatarzy a Polska	Tatars and Poland	1919	Secondary	Polish	C15-C18	Warsaw
Kromer, Marcin	Kronika Polska Marcina Kromera	Chronicle of Poland by Marcin Kromer	1611	Primary: chronicle	Polish	C16	Cracow
Krypiakevych, Ivan	Velyka istoriia Ukrainy	Great History of Ukraine	1948	Secondary	Ukrainian	C17	Lviv-Winnipeg: Ivan Tyktor
Kuczyński, Stefan M.	Ziemie czernihowsko-siewierskie pod rządami Litwy	The Chernigov-Severa Provinces under the Rule of Lithuania	1936	Secondary	Polish	C15	Warsaw: Fundusz Kultury Narodowej
Kuczyński, Stefan M.	Tatarzy pod Zbarażem	Tatars near Zbarazh	1936	Secondary	Polish	C16	*Przegląd Historyczno-Wojskowy* 8 (2): 121–144
lashchurzhinskii, Khrisanf P.	Южнорусские пленники в Крыму	South Russian Captives in the Crimea	1912	Secondary	Russian	C15-C16	*ИТУАК* 47
Lepyavko, Serhiy A.	Проблема захисту українських земель від татарських нападів і становлення козацтва	The Problem of Protecting Ukrainian Lands from Tatar Attacks and the Formation of Cossacks	2009	Secondary	Ukranian	C16	*Наукові праці історичного факультету Запорізького національного університету* 1 (26): 147-153
Majewski, Ryszard	Z problematyki walk z Tatarami w pierwszej połowie XVII wieku	The Problems of Fighting with the Tatars in the First Half of the 17th Century	1975	Secondary	Polish	C17	*Śląski Kwartalnik Historyczny Sobótka* 30 (2): 231-241
Majewski, Wiesław	Najazd tatarow w lutym 1695 r.	The Tatar Invasion in February 1695	1964	Secondary	Polish	C17	*Studia i materiaty do historii wojskowosci* 9 (1): 151-164
Majewski, Wiesław	Podhajce - letnia i jesienna kampania 1667 r.	Pidhaitsi - Summer and Autumn Campaigns of 1667	1960	Secondary	Polish	C17	*Studia i Materiały do Historii Wojskowości* 6 (1): 47–99
Malakov, Dmitry V.	Малаков Д.В. По Брацлавщине	In the Bratslav Region	1982	Secondary	Russian	C17-C18	Moscow: Iskusstvo
Mandzy, Adrian	Entrepot of the Ukrainian Steppe Frontier: An Urban History of Early Modern Karnianets-Podilsky, Origins to 1672		1998	Secondary	English	C16-C17	PhD thesis, Department of History, York University
Maslovsky, Dmitry F.	Материалы к истории военного искусства в России	Materials for the History of Military Art in Russia	1889	Primary: military records	Russian	C18	Moscow
Massa, Isaak	Краткое известие о Московии в начале XVII в	A Brief Notice of Muscovy at the Beginning of the 17th Century	1937 [C17]	Primary: travelogue	Russian (trans.)	C17	Moscow
Matsyuk, Orestes	Замки і фортеці Західної України	Castles and Fortresses of Western Ukraine	1997	Secondary	Ukranian	C15-C18	Lviv: Center for Europe
Miechowita, Maciej	Chronica Polonorum	Chronicle of the Poles	1521	Primary: chronicle	Latin	C16	Kraków: Hieronim Wietor
Milewski, Dariusz	Konstanty Ostrogski as An Opponent of the Tatars in the Eyes of Polish Historians of the 16th Century		2019	Secondary	English	C15-C16	*Codrul Cosminului* 25 (1): 127-142

Motylewicz, Jerzy	Miasta w drugiej ziemi przemyskiej i sanockiej polowie XVII i w XVIII wieku	Cities in the Second Land of Przemyśl and Sanok in the Mid-17th and 18th Centuries	1993	Secondary	Polish	C17-C18	Przemyśl: Poludniowo-Wschodni Instytut Naukowy w Przemyślu
Myszkowski, Piotr	Listy i akta Piotra Myszkowskiego generalnego starosty ziem ruskich króla Jana Olbrachta	Letters and Files of Piotr Myszkowski, the General Starost of the Ruthenian Lands of King Jan Olbracht	1898	Primary: letters, files	Polish	C15-C16	Kraków
Nagy, Rezs	A krimi tatár rabok történetérol	On the History of Prisoners Kept by the Crimean Tatars	1918	Secondary	Hungarian	C17	Losoncz
Nekrasov, Aleksandr M.	Международные отношения и народы Западного Кавказа: последняя четверть XB-первая половина XBИ	The International Relations and Peoples of the North Caucasus: Last Quarter of 15th Century – First Half of 16th Century	1990	Secondary	Russian	C16-C17	Moscow: Nauka
Novoselsky, Aleksey A.	Bor'ba Moskovskogo gosudarstva s tatarami v pervoy polovine KHVII v.	The Struggle of the Muscovite State against the Tatars in the First Half of the 17th Century	1948	Secondary	Russian	C17	Moscow-Leningrad: Publishing House of the Academy of Sciences of the USSR
Obetkó, Dezso	Az 1717-i tatárbetörés	The Tatar Incursion of 1717	1941	Secondary	Hungarian	C18	*Hadtör-ténelmi Közlemények* 42: 193–210
Ochmański, Jerzy	Organizacja obrony w Wielkim Księstwie Litewskim przed napadami Tatarów krymskich w XV–XVI wieku	Organization of Defense in the Grand Duchy of Lithuania against Attacks by the Crimean Tatars in the 15th–16th centuries	1960	Secondary	Polish	C15-C16	*Studia i Materiały do Historii Wojskowości* 5: 349–398
Ochmański, Jerzy	Organizacja obrony w Wielkim Księstwie Litewskim przed napadami Tatarów krymskich w XV–XVI wieku	The Organization of Defense in the Grand Duchy of Lithuania against Crimean Tatar Attacks in the 15th-16th Centuries	1960	Secondary	Polish	C15-C16	*Studia i Materiały do Historii Wojskowości* 5: 355-67
Oleksa, Gayvoronsky	Повелители двух материков, Том 1, Крымские ханы XV-XVI веков и борьба за наследство Великой Орды	The Lords of Two Continents, Vol. 1: Crimean Khans of the 15th-16th Centuries and the Struggle for the Great Horde's Legacy	2007	Secondary	Russian	C15-C16	Kyiv: Oranta–Maysternya
Ostapchuk, Victor	Crimean Tatar Long Range Campaigns: The View from Remmal Khoja's History of Sahib Gerey Khan		2012	Secondary	English	C16	In: *Warfare in Eastern Europe, 1500-1800*, ed. Brian J. Davies, Leiden: Brill, pp. 147-172
Penskoĭ, Vytalyĭ V.	Военный потенциал Крымского ханства в конце XV-начале XVII в.	The Military Potential of the Crimean Khanate at the End of the 15th Century - Beginning of the 17th Century	2010	Secondary	Russian	C15-C17	*Vostok* 2: 56–66
Penskoy, Vitaly V.	Сражение при Молодях 28 июля - 3 августа 1572 г	The Battle of Molodi on July 28 - August 3, 1572	2012	Secondary	Russian	C16	*История военного дела: исслед и источники* 2, July-October: 127-236
Penskoy, Vitaly V.	Численность и развёртывание московского и татарского войска в кампанию 1521 года	The Number and Deployment of the Moscow and Tatar Troops in the Campaign of 1521	2011	Secondary	Russian	C16	*VIMAIViVS* 2: 194-209
Petrushevich, Anthony S.	Сводная галицко-русская летопись с 1600 по 1700 год	Consolidated Galician-Russian Chronicle from 1600 to 1700	1874	Primary: chronicle	Russian	C17	Lviv
Pilipchuk, Yaroslav V.	Татары и Киевская земля, 1362-1471	Tatars and the Kyiv Province, 1362–1471	2015	Secondary	Russian	C15	*Крымское историческое обозрение* 1 (3): 91–119
Pilipchuk, Yaroslav V.	Пилипчук Я.В. Татарская политика Казимира IV, 1480-1492	Tatar Policy of Casimir IV, 1480–1492	2015	Secondary	Russian	C15	*Золотоордынская Цивилизация* 8: 312-320
Pilipchuk, Yaroslav V. and Mikhail A. Nesin	Пилипчук Я.В., Несин М.А. Великое Княжество Литовское и татары в период правления Александра Казимировича (1492-1506 гг.)	The Grand Duchy of Lithuania and the Tatars during the reign of Alexander Kazimirovich (1492-1506)	2016	Secondary	Russian	C15-C16	*История военного дела: исследования и источники* Special Issue 5 (2): 402-412
Plewczyński, Marek	Wojny Jagiellonów z wschodnimi i południowymi sąsiadami Królestwa Polskiego w XV wieku	The Wars of the Jagiellons with the Eastern and Southern Neighbors of the Polish Kingdom in the 15th Century	2014	Secondary	Polish	C16	Oświęcim: Napoleon V
Plewczyński, Marek	Wojny i wojskowość polska w XVI wieku, Tom I: Lata 1500–1548	Wars and the Polish Army in the 16th Century, Vol. 1: Years 1500-1548	2011	Secondary	Polish	C16	Zabrze: Inforteditions

Pochekaev, Roman Y.	Дары или дань? К вопросу о "золотоордынском наследии"в отношениях Московского царства с тюрко-татарскими ханствами	Gifts or Tribute? On the Question of the "Golden Horde Heritage" in the Relations of the Muscovy with the Turkic-Tatar Khanates	2012	Secondary	Russian	C15-C16	Средневековые тюрко-татарские государства [*Medieval Turko-Tatar States*] 4: 200-203
Pochekayev, Roman Y.	Цари ордынские: Биографии ханов и правителей Золотой Орды	Tsars of the Horde: The Biographies of the Khans and Rulers of the Golden Horde	2009	Secondary	Russian	C16	St. Petersburg: Eurasia
Podhorodecki, Leszek	Tatarzy	Tatars	1971	Secondary	Polish	C15-C18	Warsaw: Książka i Wiedza
Podhorodecki, Leszek	Chanat Krymski i jego stosunki z Polską w XV-XVIII w.	The Crimean Khanate and Its Relations with Poland in the 15th-18th Centuries	1987	Secondary	Polish	C15-C18	Warsaw: Książka i Wiedza
Pokhlebkin, William V.	Татары и Русь: 360 лет отношений Руси с татарскими государствами в XIII-XVI вв. 1238-1598 гг	Tatars and Russia: 360 Years of Relations between Russia and the Tatar states 1238-1598	2000	Secondary	Russian	C15-C16	Moscow: Mezhdunarodnyye Otnosheniya
Póléwiartek, Józef	Zniszczenia ostatniego najazdu tatarskiego w 1672 .r na obszarze ziemi sanockiej	The Destruction of the Last Tatar Invasion of Sanok in 1672	1994	Secondary	Polish	C17	*Rocznik Historyczno-Archiwalny* 6-8: 17-37
Pulaski, Kazimierz	Stosunki z Mendli-Girejem - chanem Tatarów perekopskich (1469-1515): akta i listy	Relations with Mendli-Girej - Khan of the Perekop Tatars (1469-1515): Files and Letters	1881	Primary: diplomatic documents	Polish	C15-C16	Cracow-Warsaw
Richmond, Walter	The Northwest Caucasus: Past, Present, Future		2008	Secondary	English	C15-C18	Abingdon: Routledge
Rolle, Antoni J.	Zameczki podolskie na kresach multańsksch	Podolian Castles in the Multansch Borderlands	1880	Secondary	Polish	C15-C18	Warsaw: G. Gebethner i Spółka
Rudnytskyi, Stepan	Руські землі польської корони при кінці XV в. Ворожі напади й організация пограничної оборони	Russian Lands of the Polish Crown at the End of the 15th Century: Enemy Attacks and Organization of Border Defense	1899	Secondary	Ukrainian	C15	Lviv: Notes of the National Academy of Sciences
Safargaliev, Magamet G.	Распад Золотой Орды	The Collapse of the Golden Horde	1960	Secondary	Russian	C15-C16	Saransk: Mordov
Sanin, Gennady A.	Отношения России и Украины с Крымским ханством в середине XVII века	Relations of Russia and Ukraine with the Crimean Khanate in the Middle of the 17th Century	1987	Secondary	Russian	C17	Moscow: Nauka
Schmidt, Sigurd O.	К характеристике русско-крымских отношений второй четверти XVI в.	On the Characteristics of Russian-Crimean Relations in the Second Quarter of the 16th Century	1961	Secondary	Russian	C16	In: Международные связи России до XVII в.: Сборник статей, eds. Aleksandr A. Zimin and Vladimir T. Pashuto, Moscow
Senai, Kırımlı H.M.	Historia chana Islam Gereja III	History of Khan Islam Gerei III	1971 [C17]	Primary: chronicle	Turkish, Polish	C17	Warsaw
Senai, Kırımlı H.M.	Книга походов: история хана Ислям-Гирая III	Book of Campaigns: The History of Khan Islam Giray III	1998	Primary: chronicle	Russian	C17	Simferopol
Shirogorov, Vladimir	War on the Eve of Nations: Conflicts and Militaries in Eastern Europe, 1450-1500		2021	Secondary	English	C15-C16	Lanham, MD: Lexington Books
Shmidt, Sigurd O.	Русские полоняники в. Крыму и система их выкупа в середине XVI в.	Russian Captives in the Crimea and the System of their Redemption in the Middle of the 16th Century	1961	Secondary	Russian	C16	In: *Вопросы социально-экономической историй и источниковедения периода феодализма в России*, ed. Nikolay V. Ustyugov, Moscow: Nauka, pp. 30-34
Sitsinsky, Efim	Под и лля п и д Владою Литвы	Podolia under the Rule of Lithuania	2009	Secondary	Ukranian	C15-C16	Kamianets-Podilsky: Medobory
Skorupa, Dariusz	Poselstwo na Krym Nikodema Kossakowskiego. Przyczynek do stosunków polsko-tatarskich w ostatnich latach XVI wieku	Mission to the Crimea by Nikodem Kossakowski: A Contribution to Polish-Tatar Relations in the Last Years of the 16th Century	2001	Secondary	Polish	C16	*Kwartalnik Historyczny* 108, No. 2: 24-42.
Skorupa, Dariusz	Stosunki polsko-tatarskie 1595–1623	Polish-Tatar Relations, 1595–1623	2004	Secondary	Polish	C16-C17	Warsaw: Neriton
Smirnov, Aleksej P.	Проблемы истории северного Причерноморья в античную эпоху	Problems of the History of the Northern Black Sea Region in Antiquity	1959	Secondary	Russian	C15-C18	Moscow: Izdatel'stvo Akademii Nauk SSSR

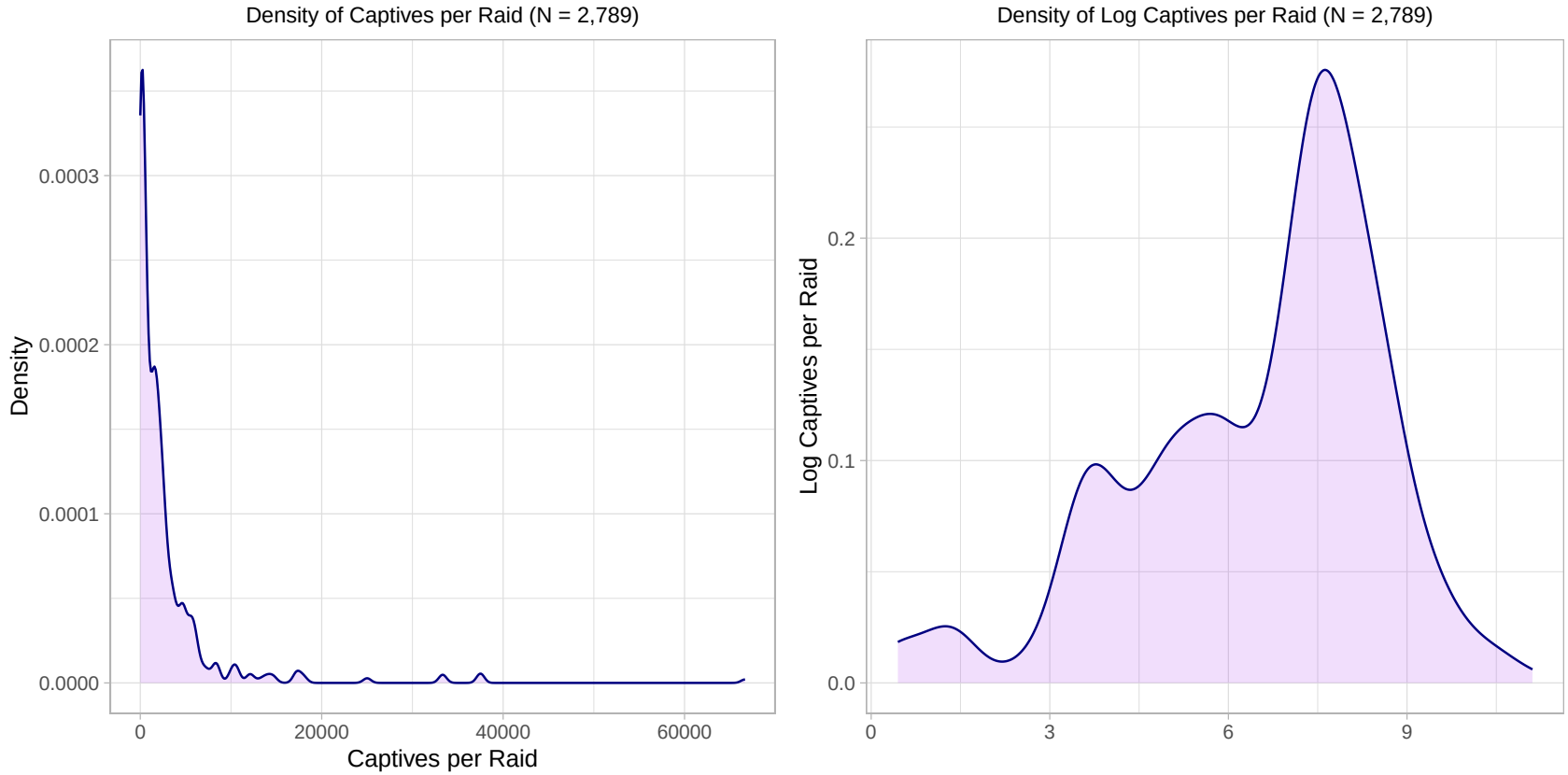
Smirnov, Vasily D.	Крымское ханство под верховенством Оттоманской Порты до начала XVIII века	Crimean Khanate under the Rule of the Ottoman Port until the Beginning of the 17th Century	1887	Secondary	Russian	C16-C17	St. Petersburg: University Printing House
Sofonovych, Feodosiĭ	Khronika z litopystsiv starodavnikh	Chronicle of Ancient Chroniclers	1992 [C17]	Primary: chronicle	Ukranian	C16-C17	Kiev: Naukova dumka
Spuler, Bertold	Die Goldene Horde: die Mongolen in Russland, 1203-1502	The Golden Horde: The Mongols in Russia, 1203-1502	1965	Secondary	German	C15-C16	Wiesbaden: Otto Harrassowitz
Stołecki, Kazimierz	Tatarskie najazdy - obrazy zapisane w starych księgach	Tatar Invasions: Images Recorded in Old Books	2010	Secondary	Polish	C16	*Nestor: Czasopismo Artystyczne* 2 (12): 9-14
Storozhenko, Andrei V.	Стефан Баторий и днепровские козаки	Stefan Batory and the Dnieper Cossacks	1904	Secondary	Russian	C16	Kyiv: Printing house of G.L. Frontskevich
Stryjkowski, Maciej	Kronika polska, litewska, żmódzka i wszystkiej Rusi	Chronicle of Poland, Lithuania, Samogitia, and all of Ruthenia	1582	Primary: chronicle	Polish	C15-C16	Königsberg
Stryjkowski, Maciej	O początkach, wywodach, dzielnościach, sprawach rycerskich i domowych sławnego narodu litewskiego, żemojdzkiego i ruskiego	About the Beginnings, Arguments, Bravery, Knightly, and Domestic Matters of the Famous Lithuanian, Zemojdy, and Ruthenian Nation	1978 [C16]	Primary: chronicle	Polish	C15-C16	Warsaw
Sulimierski, Filip et al.	Słownik Geograficzny Królestwa Polskiego and innych dzączy słowiańskich	Geographical Dictionary of the Kingdom of Poland and Other Slavic Nations	1880-1902	Secondary	Polish	C15-C18	Warsaw
Tafur, Pero	Andanças É Viajes De Pero Tafur Por Diversas Partes Del Mundo Avidos (1435-1439)	Adventures and Travels of Pero Tafur through Various Parts of the World (1435-1439)	1874 [C15]	Primary: travelogue	Ukranian	C15	Madrid
Tankov, Anatolīĭ A.	Историческая летопись Курского дворянства	Historical Chronicle of the Kursk Nobility	1913	Secondary	Russian	C17	Moscow
Tankov, Anatoly A.	Историческая летопись курского дворянства	Historical Chronicle of the Kursk Nobility	1913	Secondary	Russian	C16-C17	Moscow
Tepkeev, Vladimir T.	Взаимоотношения калмыцкого ханства и кубанской орды в 1712–1715 гг.	Relations between the Kalmyk Khanate and the Kuban Horde in 1712-1715	2018	Secondary	Russian	C18	*Magna Adsurgit: Historia Studiorum* 2: 15-34.
Timov, Ivan	Хронологія перших татарських і турецьких набігів на землі Руського воєводства у XV ст.	Chronology of the First Tatar and Turkish Raids on the Lands of the Russian Voivodeship in the 15th Century	2013	Secondary	Russian	C15	*Чорноморський літопис* 7: 60-71
Toropitsyn, Ilya V.	Набеги кубанских татар на Россию в 1715 г	The Raids of the Kuban Tatars on Russia in 1715	2008	Secondary	Russian	C18	*Kozats'ka Spadshchina* 4: 72-78
Unknown	Супрасльская летопись	Supraśl Chronicle	1980 [C16]	Primary: chronicle	Russian	C15-C16	Vol. 35, Complete Collection of Russian Chronicles, Moscow
Unknown	Слуцкая летопись	Slutsk Chronicle	1980 [C16]	Primary: chronicle	Russian	C15	Vol. 35, Complete Collection of Russian Chronicles, Moscow
Unknown	Московско-Академическая летопись	Moscow Academic Chronicle	1927 [C16]	Primary: chronicle	Russian	C15	Vol. 1, Complete Collection of Russian Chronicles, Moscow
Unknown	Acta kościola farnego ostrogskiego	Record of the Parish Church in Ostrogski	1934 [C17]	Primary: church records	Polish	C16	Rocznik wołyński, Równe
Unknown	Kronika Kościoła Famego Ostrogskiego	Chronicle of the Parish Church in Ostrogski	1621	Primary: chronicle	Polish	C15-C16	Provincial State Archives in Cracow, Sec. I, Sanguszko Archive
Unknown	Skarbiec diplomatów papieskich, cesarskich, królewskich, książęcych, uchwał narodowych, postanowień różnych władz i urzędów do wyjaśnienia dziejów Litwy, Rusi Litewskiej i ościennych krajów	Treasury of Papal, Imperial, Royal, and Ducal Diplomats, National Resolutions, Decisions of Various Authorities and Offices To Explain the History of Lithuania, Lithuanian Ruthenia, and Neighboring Countries	1862	Primary: diplomatic documents	Polish	C15-C16	Wilno
Unknown	Летопись Рачинского	Chronicle of Rachinsky	1980	Primary: chronicle	Russian	C15-C16	Vol. 35, Complete Collection of Russian Chronicles, Moscow

Unknown	Гу́стынская ле́топись	Gustyn Chronicle	2003 [C17]	Primary: chronicle	Russian	C16	Vol. 40, Complete Collection of Russian Chronicles, St. Petersburg
Unknown	Львовская летопись	Lviv Chronicle	1910-1914	Primary: chronicle	Russian	C15-C17	Vol. 20, Complete Collection of Russian Chronicles, St. Petersburg
Unknown	Острожский летописец	Ostroh Chronicle	2009	Primary: chronicle	Ukrainian	C16-C17	Kyiv
Unknown	Белору́сско-лито́вские ле́тописи	Western Russian Chronicles	1907	Primary: chronicle	Russian	C15-C16	Vol. 17, Complete Collection of Russian Chronicles, St. Petersburg
Unknown	Ольшевская летопись	Olshevo Chronicle	1980	Primary: chronicle	Russian	C15-C16	Vol. 35, Complete Collection of Russian Chronicles, Moscow
Unknown	Румянцевская летопись	Rumyantsev Chronicle	1980	Primary: chronicle	Russian	C15-C16	Vol. 35, Complete Collection of Russian Chronicles, Moscow
Unknown	Евреиновская летопись	Jewish Chronicle	1980	Primary: chronicle	Russian	C15-C16	Vol. 35, Complete Collection of Russian Chronicles, Moscow
Unknown	Никоновская летопись	Nikon Chronicle	1904-06	Primary: chronicle	Russian	C15-C16	Vol. 13, Complete Collection of Russian Chronicles, St. Petersburg
Unknown	Akty, otnosyashchiyesya k istorii Yuzhnoy i Zapadnoy Rossii	Acts Relating to the History of Southern and Western Russia	1863-1892	Primary: diplomatic, legal documents	Russian	C15-C16	St. Petersburg: Archaeographic Commission
Unknown	Lietuvos Metriką	Lithuanian Metrics	1846-1915	Primary: legal documents	Lithuanian, Latin, Polish	C15-C16	Vilnius
Unknown	Zherela do istoriyi Ukrayiny-Rusy	Sources for the History of Ukraine-Russia	1895-1924	Primary: chronicle	Ukranian	C16-C18	Lviv
Unknown	Черниговская летопись	Chernigov Chronicle	1856	Primary: chronicle	Ukranian	C16-C18	Kiev
Unknown	Mezhigorskaya letopis'	Mezhigorsk Chronicle	1888	Primary: chronicle	Ukrainian	C17	Kyiv
Unknown	Иоасафовская летопись	Joasaph Chronicle	1957 [C16]	Primary: chronicle	Russian	C15-C16	Moscow
Unknown	Симеоновская летопись	Simeon Chronicle	1913 [C15]	Primary: chronicle	Russian	C15	St. Petersburg
Unknown	Лицевой летописный свод	Illustrated Chronicle of Ivan the Terrible	2008 [C16]	Primary: chronicle	Russian	C15-C16	Moscow
Unknown	Вологодско-Пермская летопись	Vologda-Perm Chronicle	1959 [C16]	Primary: chronicle	Russian	C15-C16	Vol. 26, Complete Collection of Russian Chronicles, Moscow
Unknown	Воскресенская летопись	Resurrection Chronicle	1998 [C16]	Primary: chronicle	Russian	C15-C16	Vol. 7, Complete Collection of Russian Chronicles, Ryazan
Unknown	Новгородская и Псковская летописи	Novgorod and Pskov chronicles	1848 [C17]	Primary: chronicle	Russian	C15-C16	Vol. 4, Complete Collection of Russian Chronicles, St. Petersburg
Unknown	Хроника литовская и жмойтская	Lithuanian and Zemoit Chronicle	1975	Primary: chronicle	Russian	C15-C16	Vol. 32, Complete Collection of Russian Chronicles, Moscow
Unknown	Белорусско-литовские летописи	Belorussian-Lithuanian Chronicles	1980	Primary: chronicle	Russian	C15	Vol. 35, Complete Collection of Russian Chronicles, Moscow
Unknown	Славяно-молдавские летописи XV-XVI вв.	Slavic-Moldovan Chronicles of the 15th–16th centuries	1976	Primary: chronicle	Russian	C15-C16	Moscow: Nauka
Unknown	Густынская летопись	Gustyn Chronicle	2003	Primary: chronicle	Russian	C15-C16	Vol. 40, Complete Collection of Russian Chronicles, St. Petersburg

Unknown	Ермолинская летопись	Ermolin Chronicle	1910	Primary: chronicle	Russian	C15	Vol. 23, Complete Collection of Russian Chronicles, St. Petersburg
Unknown	Літописець Дворецьких	Dvoretsky Chronicle	1984	Primary: chronicle	Ukranian	C17	In *Летописи и хроники*, ed. Victor I. Buganov, pp. 219-234, Moscow: Nauka
Unknown	Софийская вторая летопись	Second Sofia Chronicle	1853	Primary: chronicle	Russian	C17-C18	Vol. 6, Complete Collection of Russian Chronicles, St. Petersburg
Unknown	Холмогорская летопись	Kholmogory Chronicle	1977	Primary: chronicle	Russian	C15-C16	Vol. 33, Complete Collection of Russian Chronicles, Leningrad
Unknown	Хроника Быховца	Bykhovets Chronicle	1975	Primary: chronicle	Russian	C15-C16	Vol. 17, Complete Collection of Russian Chronicles, St. Petersburg
Unknown	Летописец начала царства царя и великого князя Ивана Васильевича; Александро-Невская летопись; Лебедевская летопись	Chronicle of the Beginning of the Kingdom; Alexander Nevsky Chronicle; Lebedev Chronicle	1965	Primary: chronicle	Russian	C16	Vol. 29, Complete Collection of Russian Chronicles, Moscow
Unknown	Rákóczi eposz	Rákóczi Epic	1988	Primary: chronicle	Hungarian	C17	Budapest
Ureche, Grigore	Letopiseţul Ţării Moldovei	Chronicle of the Land of Moldavia	1845-1852 [C17]	Primary: chronicle	Romanian	C15-C16	Iasi
Various	Архив Юго-Западной России	Archive of Southwestern Russia	1859-1914	Primary: legal documents	Ukrainian	C15-C18	Kyiv
Various	Акты Западной России	Acts of Western Russia	1846-1853	Primary: legal documents	Russian	C15-C17	St. Petersburg
Various	Acta Tomiciana	Tomician Acts	1852-1999	Primary: diplomatic, legal documents	Latin, Polish, German	C15-C16	Poznań
Various	Сборник летописей, относящихся к истории Южной и Западной Руси	Collection of Chronicles Relating to the History of Southern and Western Rus'	1888	Primary: chronicle	Ukranian	C15-C16	Kyiv
Various	Kniga posol'skaya Metriki Velikogo knyazhestva Litovskogo	The Ambassador's Book of Metrics of the Grand Duchy of Lithuania	1843	Primary: diplomatic documents	Russian	C15-C16	Moscow
Various	Archiwum książąt Lubartowiczów Sanguszków w Sławucie	Archives of the Lubartowicz Sanguszko Princes in Sławuta	1887	Primary: diplomatic documents	Polish	C15-C16	Lviv
Various	Źródła dziejowe	Historical Sources	1876-1915	Primary: accounts, property registers, inspection records	Polish	C16-C17	Warsaw
Various	Katalog dokumentów tureckich : dokumenty do dziejów Polski i krajów ościennych w latach 1455-1672	Catalog of Turkish Documents: Documents on the History of Poland and Neighboring Countries in the Years 1455-1672	1959	Primary: miscellaneous documents	Polish	C15-C17	Warsaw: National Scientific Publishing House
Various	Listy polskie XVI wieku, T. 1: Listy z lat 1525-1548	Polish Letters of the 16th Century, Vol. 1: Letters from the Years 1525-1548	1998	Primary: letters	Polish	C16	Kraków: Polskiej Akademii Umiejętności
Various	Сборник Императорского Русского Исторического Общества	Collection of the Imperial Russian Historical Society	1867-1916	Primary: diplomatic documents	Russian	C15-C18	St. Petersburg

Various	Źródła dziejowe	Historical Sources	1876-1915	Primary: legal, diplomatic documents	Polish	C16-C17	Warsaw
Vinogradov, Aleksandr V.	Russko-krymskie otnošenija: 50-e-vtoraja polovina 70-x godov XVI veka	Russian-Crimean Relations: 1650s-Second Half of the 1670s	2007	Secondary	Russian	C17	Moscow: Institute of Russian History
Volkov, Vladimir A.	Voyny i voyska Moskovskogo gosudarstva (konets XV — pervaya polovina XVII vv.)	Wars and Troops of the Muscovite State (End of the 15th - First Half of the 17th Centuries)	2004	Secondary	Russian	C15-C17	Moscow: Eksmo
Volodymyrsky-Budanov, Mikhail F.	Население Юго-Западной России от половины XV в. до Люблинской унии	The Population of Southwestern Russia from the Second Half of the 15th Century to the Union of Lublin	1891	Secondary	Russian	C15-C16	Kyiv
von Engel, Johann Christian	Geschichte der Ukraine und der ukrainischen Cosaken: wie auch der Königreiche Halitsch und Wladimir	History of Ukraine and the Ukrainian Cossacks As Well As the Kingdoms of Halych and Vladimir	1796	Secondary	German	C15-C18	Halle: Johann Jacob Gebauer
von Herberstein, Sigismund	Rerum Moscoviticarum Commentarii	Notes on Muscovite Affairs	1851-1852	Primary: travelogue	English (trans.)	C15-C16	London: Hakluite Society
Von Manstein, Christof H.	Contemporary Memoirs of Russia from the Year 1727 to 1744		1856	Primary: memoir	English (trans.)	C18	London: Longman, Brown, Green, and Longmans
Voronchuk, Iryna O.	Naselennya Volyni v XVI - pershiy polovyni XVII st.: rodyna, domohospodar - stvo, demohrafichni chynnyky	The Population of Volyn from the 16th Century to the First Half of the 19th Century: Family, Household, Demographic Factors	2012	Secondary	Ukranian	C15-C17	Kyiv
Wagner, Marek	W cieniu szukamy jasności chwały : studia z dziejów panowania Jana III Sobieskiego (1684-1696)	In the Shadow We Seek the Brightness of Glory: Studies of the History of the Reign of John III Sobieski (1684-1696)	2002	Secondary	Polish	C17	Siedlce: Wydawnictwo Akademii Podlaskiej
Walawender, Antoni	Kronika klęsk elementarnych w Polsce i w krajach sąsiednich w latach 1450-1586	A Chronicle of Elemental Disasters in Poland and Neighboring Countries in the Years 1450-1586	1932	Secondary	Polish	C15-C16	Lviv
Wapowski, Bernard	Kroniki Bernarda Wapowskiego z Radochoniec	Chronicles of Bernard Wapowski from Radochoniec	1874	Primary: chronicle	Polish	C15-C16	Kraków
Wapowski, Bernard	Dzieje Korony Polskiéj i Wielkiego Księstwa Litewskiego od roku 1380 do 1535	The History of the Polish Crown and the Grand Duchy of Lithuania from 1380 to 1535	1848	Secondary	Polish	C15-C16	Wilno: T. Glücksberg
Winiarz, Alojzy	Ziemia sanocka w latach 1463-1552	Sanok in the Years 1463-1552	1896	Secondary	Polish	C15-C16	*Kwartalnik Historyczny* 10 (2): 286-306
Witsen, Nicolaes	Noord en Oost Tartarye	North and East Tartary	1705	Primary: memoir	Dutch	C17	Amsterdam
Wójcik, Zbigniew	Mediacja tatarska między Polską a Turcją w roku 1672	Tatar Mediation between Poland and Turkey in 1672	1962	Secondary	Polish	C17	*Przegląd Historyczny* 53 (1): 32–50.
Yağcı, Zübeyde G.	Yüzyılda Kırım'da Köle Ticareti	Slave Trade in Crımea Durıng the 16th Century	2006	Secondary	Turkish	C16	*Karadeniz Araştırmaları* 8: 12-30
Yakobson, Anatoly L.	Средневековой Крым: Очерки истории и истории материальной культуры	Medieval Crimea: Essays on History and the History of Material Culture	1964	Secondary	Russian	C15-C18	Moscow-Leningrad
Zenchenko, Yury P.	Южное российское порубежье в конце XVI-начале XVII в	Southern Russian Border at the End of the 16th Century - Beginning of the 17th Century	2008	Secondary	Russian	C16-C17	Moscow: Pamyatniki istoricheskoy mysli
Zgorniak, Marian	Wojskowość polska w dobie wojen tureckich drugiej połowy XVII wieku	Polish Military in the Era of Turkish Wars, Second Half of the Seventeenth Century	1985	Secondary	Polish	C17	Wrocław: Zakład Narodowy im. Ossolińskich
Zimorovich, Bartolomey	Тройнóй Львов	Leopolis Triplex	2002 [C16]	Primary: chronicle	Russian (trans.)	C15-C16	Lviv: Center for Europe
Zubrytsky, Denis	Критико-историческая повесть временных лет Червонной или Галицкой Руси	Critical-Historical Tale of the Bygone Years of Red or Galician Rus	1845	Secondary	Russian	C15	Moscow
Zubrytsky, Denis	Kronika miasta Lwowa	Chronicle of the City of Lviv	1844	Primary: chronicle	Polish	C15-C18	Lviv

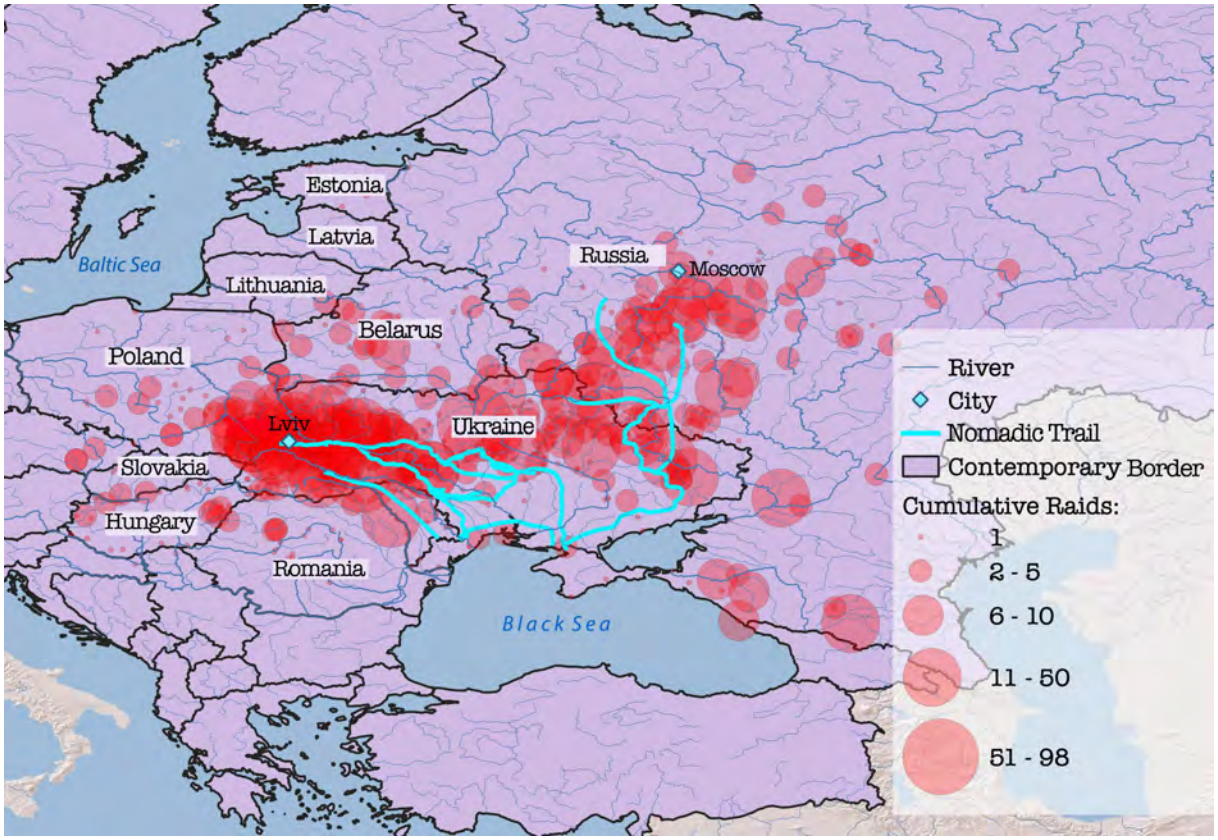
FIGURE A1. Density of Captives per Slave Raid



Notes: This figure plots the density of captives — absolute (left panel) and logged (right panel) — per nomadic slave raid in the early modern Black Sea region. Between 1453 and 1777, 2,789 raids were carried out in 735 unique locations (mostly villages, towns, cities, and fortresses areas) across 14 contemporary countries in Eastern Europe.

A.2 Additional Maps

FIGURE A2. Geographical Distribution of Slave Raids with Contemporary State Borders



Notes: This map shows the location of nomadic slave raids in the Black Sea region between 1453 and 1777 with contemporary state borders. The raids span 14 contemporary countries: Belarus, Croatia, Czech Republic, Estonia, Hungary, Lithuania, Moldova, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, and Ukraine.

B Estimating Total Slaves

This appendix describes our imputation-based strategy for estimating the total number of people enslaved during the early modern Black Sea slave trade. We impute missing captives data for all observations in our raids dataset — 53% of which lack such information — using the machine learning-based method of multiple imputation with denoising autoencoders (MIDAS) (Lall and Robinson 2022, 2023).[1] MIDAS makes use of denoising autoencoders, a type of unsupervised neural network designed to reduce dimensionality by corrupting a random subset of observed values and attempting to reconstruct them via a series of nested nonlinear transformations. These networks are repurposed to treat missing values as an additional portion of corrupted data and draw imputations from a model trained to minimize the reconstruction error on the originally observed portion. MIDAS offers two advantages over related approaches. First, as a form of multiple — rather than single — imputation, it preserves relationships within the observed data while representing uncertainty about the correct imputation model (Lall 2016). Second, by leveraging the ability of deep neural networks to learn highly complex relationships between variables, it delivers state-of-the-art imputation performance in terms of both accuracy and speed.

The MIDAS workflow comprises four steps:

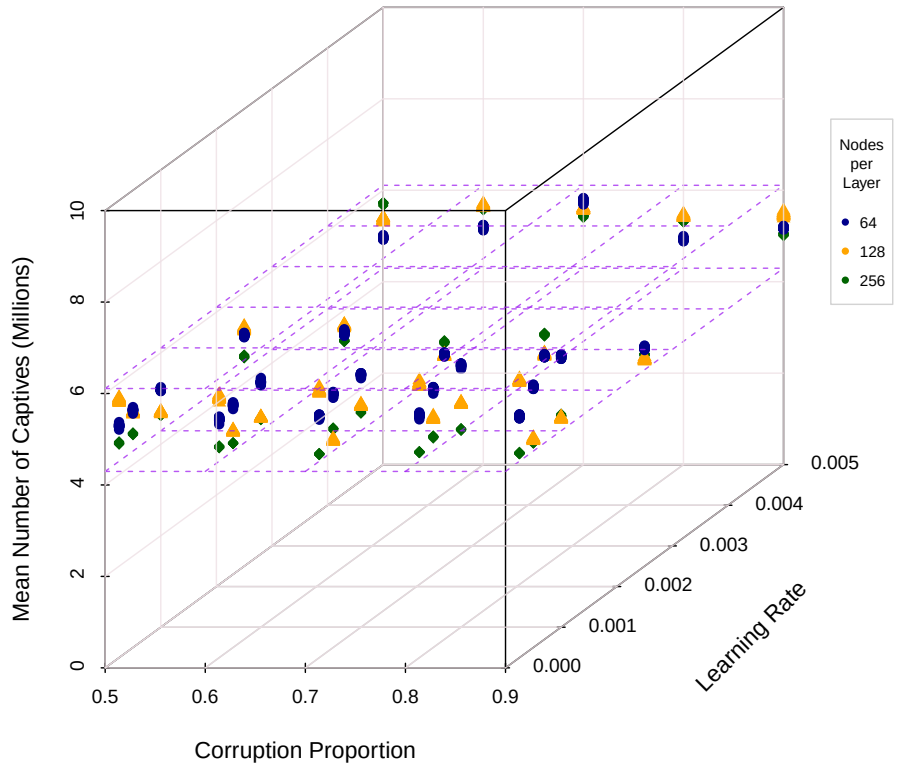
1. *Preprocessing*. We prepare the raids dataset for imputation by removing nonessential indices and other variables that provide no new information, logging skewed variables to improve their predictive power, and "one-hot encoding" categorical variables (i.e., converting them into separate dummy variables for each unique class). The preprocessed dataset includes the following raid-year-level variables: year, number of captives (the variable of interest), raiding party size, logarithm of raiding party size, location longitude, location latitude, and one-hot-encoded versions of location, location country, and location type (e.g., village, town, city).

2. *Initialization*. We initialize a MIDAS neural network, which requires specifying three key "hyperparameters":[2] the layer structure, that is, the number of hidden network layers and the number of nodes in each layer; the proportion of observed values in the input dataset that are corrupted; and the learning rate, which controls the size of the adjustment made to weights and biases during training. As there is no way of knowing the optimal imputation model, we experiment with a variety of hyperparameter choices suggested by Lall and Robinson (2023): two-layer networks with 256, 128, and 64 nodes per layer; corruption proportions of 0.5, 0.6, 0.7,

[1] We implement MIDAS using the `Python` package **MIDASpy**, which allows for greater flexibility in customizing parameters than its `R` counterpart, **rMIDAS** (Lall and Robinson 2023, 17).

[2] Hyperparameters are features of neural networks that are manually specified by the analyst rather than learned during training.

FIGURE A3. Estimated Total Slaves with Varying Imputation Models



Notes: This figure plots the number of captives (y-axis) in 1,500 completed versions of our raids dataset generated by the **MIDASpy** package in Python, which implements the neural network-based method of multiple imputation with denoising autoencoders (MIDAS). Following Lall and Robinson's (2023) guidelines, we vary three key hyperparameters in the **MIDASpy** algorithm: (1) the number of nodes in the neural network's two hidden layers (separated by color); (2) the proportion of input values that are stochastically corrupted (x-axis); and (3) the size of the adjustment made to weights during training (z-axis). The dotted horizontal planes indicate the minimum and maximum number of captives in the sample. The imputation model includes raid date, location, location type, and raiding party size.

0.8 and 0.9; and learning rates of 0.0005, 0.0025, 0.001, 0.0025, and 0.005.[3]

3. *Building and training*. We build and train the MIDAS model. To determine the length of the training process, we employ the diagnostic tool of "overimputation" (Lall and Robinson 2023, 23-26), which involves omitting random observed values, generating multiple imputations for each one, and assessing the accuracy of these imputations. Regardless of our hyperparameter choices, imputation error declines sharply over the first 25 training "epochs" — complete passes through the MIDAS network — but little thereafter. Accordingly, we train the imputation

[3] As the preprocessed dataset is medium-sized, a larger number of hidden layers is not necessary (and could result in overfitting).

model for 25 epochs.

4. *Imputation*. Finally, we draw imputed values from the trained imputation model, producing 20 "completed" versions of the raids dataset (in which all values are observed).

Figure A3 displays the number of captives in all 75 sets of completed datasets resulting from the combinations of layer structures, corruption proportions, and learning rates discussed earlier (1,500 datasets in total). The estimates range from 4.30 million to 6.11 million (indicated by the dotted horizontal planes), with 53% exceeding 5 million and 93% exceeding 4.5 million. The overall mean is 5.06 million; the standard deviation is 0.45 million. Consistent with a roughly normal distribution, 57% of means lie within one standard deviation of the mean and 98% within two standard deviations. Using a 95% confidence standard, the range of estimates becomes 4.16-5.96 million. As noted in the main text, mean imputation yields a significantly higher — though, in our view, less plausible — figure of 7.76 million.

In general, captive estimates are larger when the number of nodes per hidden layer is smaller, the corruption proportion is lower, and the learning rate is higher. However, these differences are modest in size. The gap between the estimates produced by the highest and lowest numbers of nodes, corruption proportions, and learning rates is 0.46 million, 0.04 million, and 0.42 million, respectively, which represent, 1.03, 0.08, and 0.93 standard deviations. In other words, the imputation results do not exhibit high levels of sensitivity to MIDAS network hyperparameters, increasing our confidence in their robustness.

C Urban Population Analysis

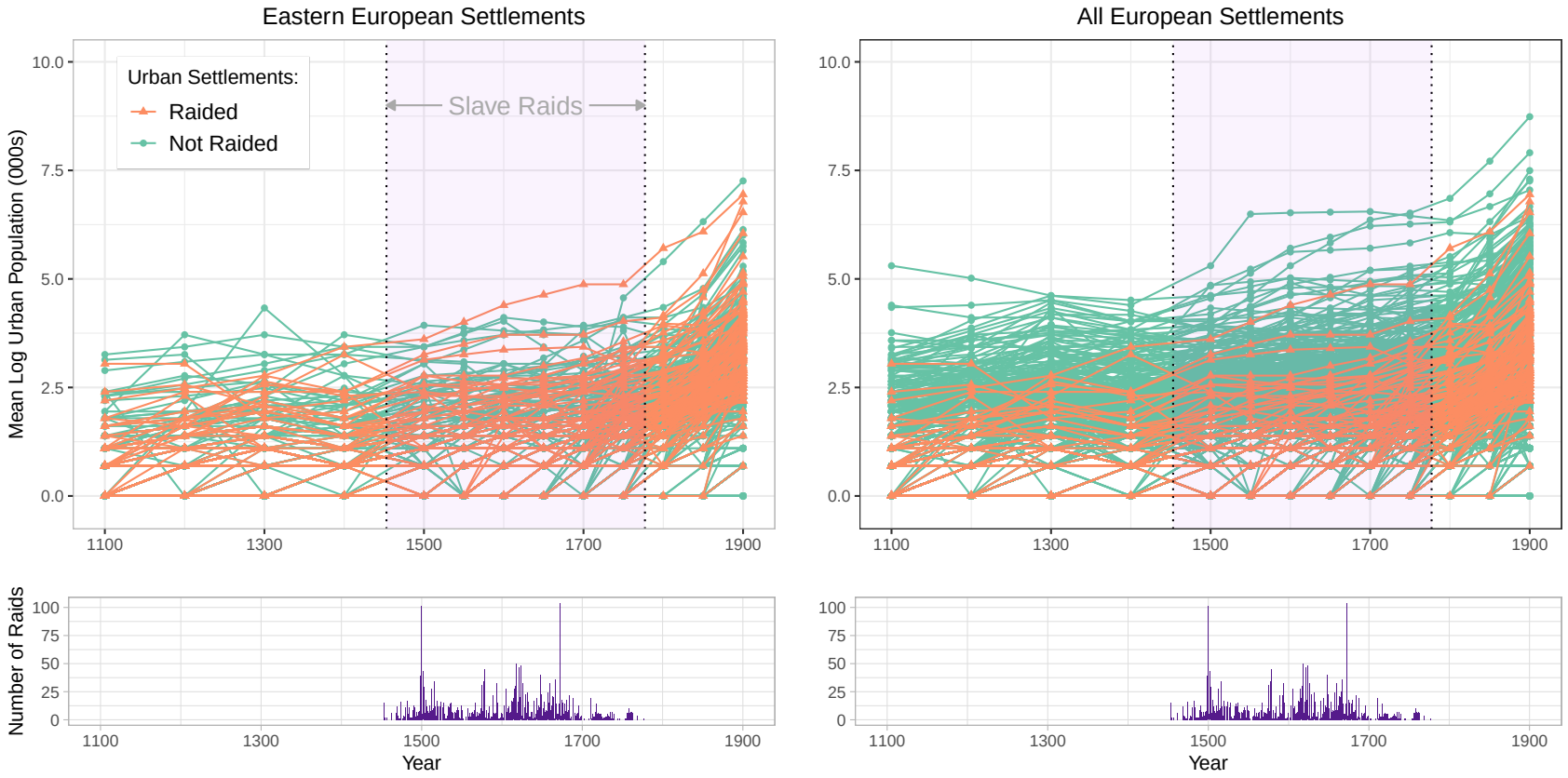
C.1 Descriptive Data

TABLE A2. Summary Statistics for Urban Population Analysis

	N	Mean	St. Dev.	Min	Max
Panel A: Eastern European Settlements					
Log Settlement Population (P_{st})	7,149	1.243	1.074	0.000	7.258
Raids Indicator Settlement Raided (R_{st})	7,150	0.126	0.332	0	1
Log Cumulative Raids	7,150	0.192	0.587	0.000	4.443
Log Cumulative Captives	7,150	0.764	2.451	0.000	11.648
Panel B: Pre-Slavery Eastern European Settlements					
Log Settlement Population (P_{st})	4,900	1.515	0.986	0.000	6.946
Raids Indicator (R_{st})	4,901	0.139	0.346	0	1
Log Cumulative Raids	4,901	0.216	0.636	0.000	4.443
Log Cumulative Captives	4,901	0.812	2.560	0.000	11.648
Panel C: Post-Slavery Eastern European Settlements					
Log Settlement Population (P_{st})	2,249	0.651	1.018	0.000	7.258
Raids Indicator (R_{st})	2,249	0.098	0.298	0	1
Log Cumulative Captives	2,249	0.139	0.459	0.000	3.219
Log Settlement Population	2,249	0.659	2.193	0.000	11.107
Panel D: All European Settlements					
Log Settlement Population (P_{st})	29,405	1.588	1.009	0.000	8.737
Raids Indicator (R_{st})	29,406	0.031	0.172	0	1
Log Cumulative Captives	29,406	0.047	0.301	0.000	4.443
Log Cumulative Captives	29,406	0.186	1.252	0.000	11.648

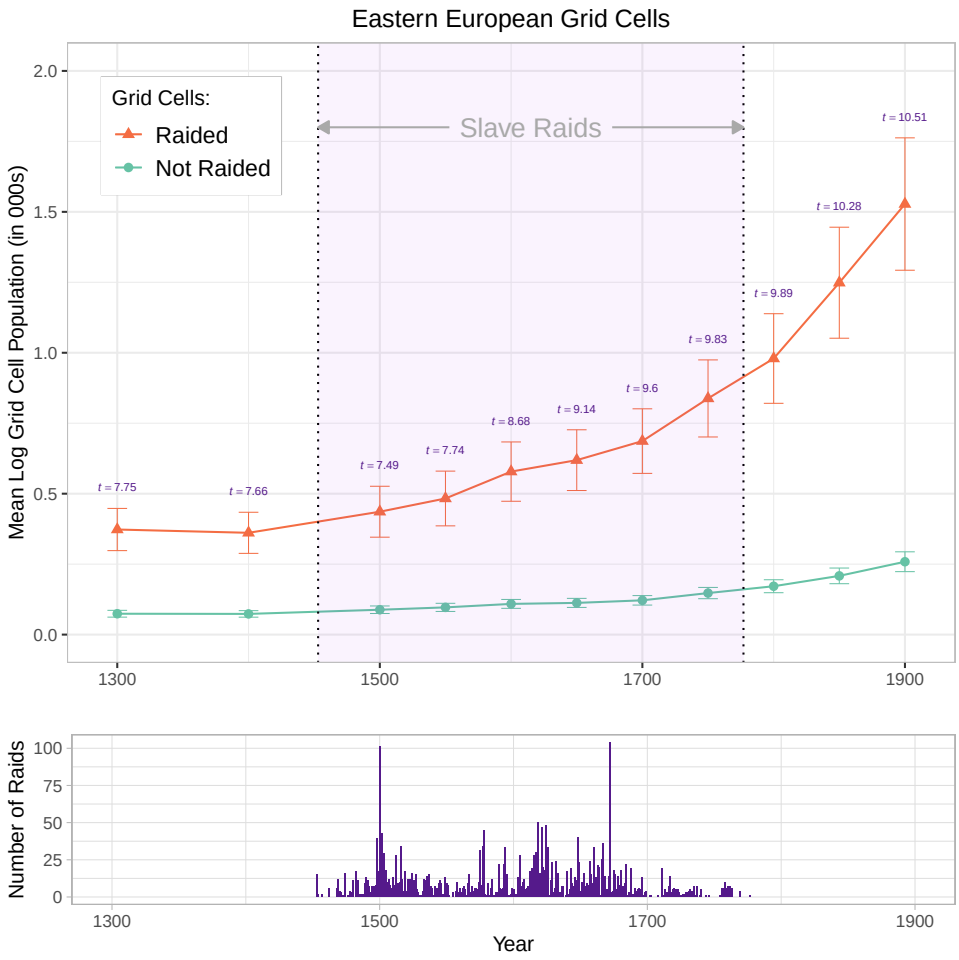
Notes: This table reports summary statistics for the four samples employed in our main difference-in-differences analysis of the impact of nomadic slave raids on the population of European urban settlements between 1100 and 1900 (Figure 4). Population is recorded in thousands prior to logarithmic transformation.

FIGURE A4. Population of Individual Raided and Non-Raided Urban Settlements, 1100-1900



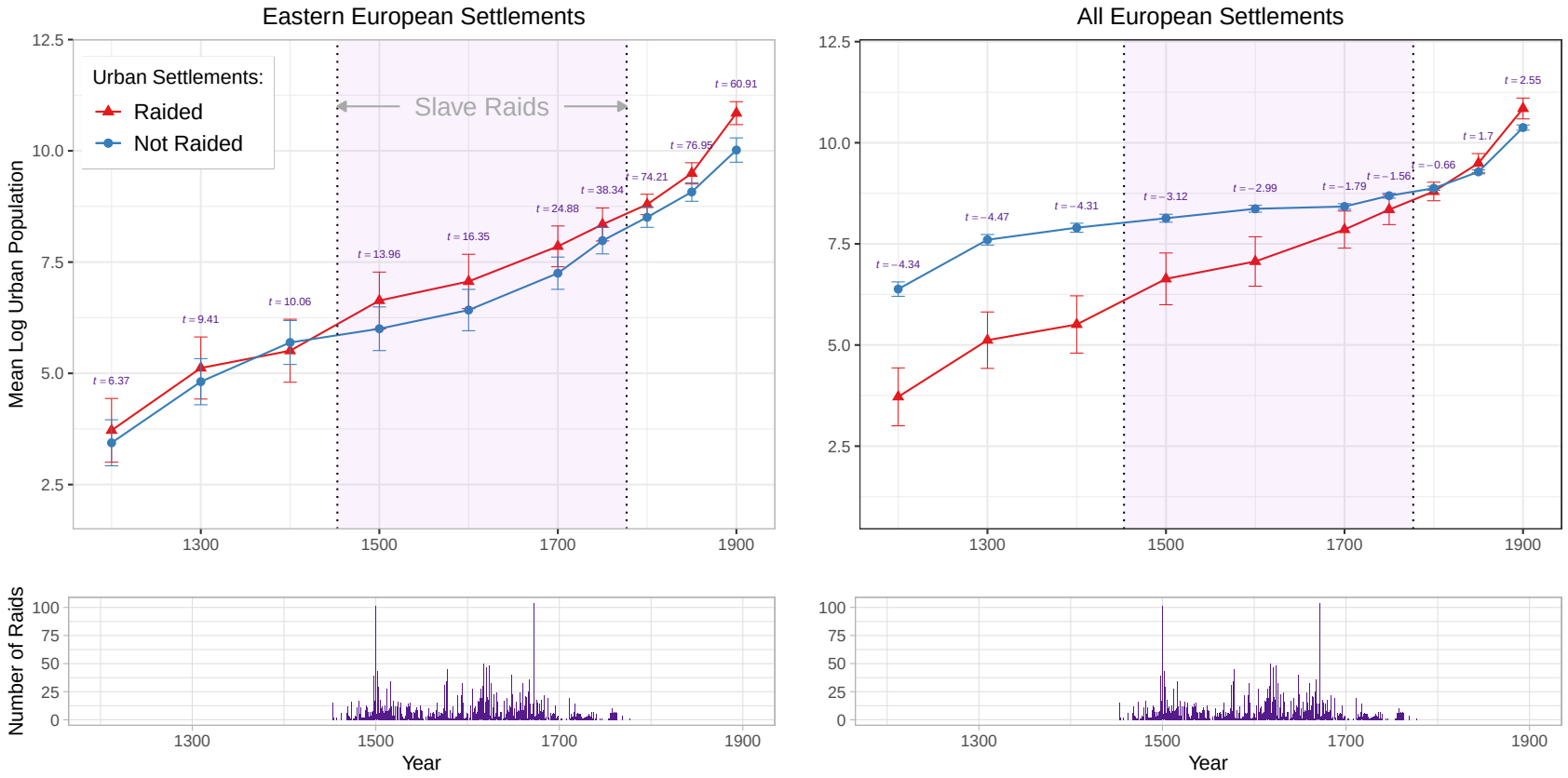
Notes: This figure plots the logarithm of the population of individual European urban settlements (in thousands) between 1100 and 1900, comparing those that were raided at least once by nomads with those that were never raided. The left panel comprises 550 settlements in Eastern Europe; the right panel includes all 2,262 settlements in the European Urban Population, 700-2000 database (Buringh 2021). The lower panels display the total number of raids per year.

FIGURE A5. Mean Population of Raided and Non-Raided Grid Cells



Notes: This figure replicates Figure 3 using grid cells rather than urban settlements as the unit of observation. The sample comprises 3,905 grid cells measuring 0.5×0.5° (roughly 50km×50km at the equator), which are shown in Figure A16. Bars represent 95% confidence intervals; the text above them indicates *t*-statistics from a two-sample *t*-test of the difference in means between raided and non-raided settlements. The lower panels display the total number of raids per year. Grid cells are based on the PRIO-GRID dataset (Tollefsen, Strand, and Buhaug 2012).

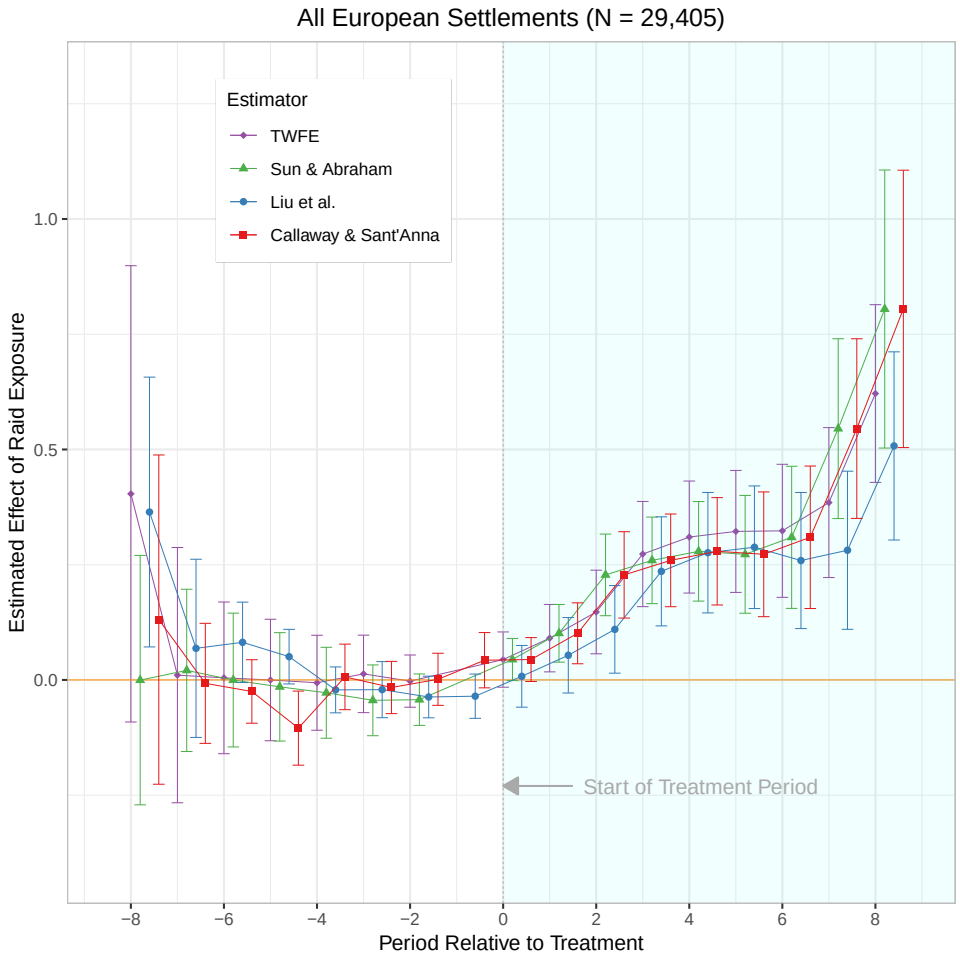
FIGURE A6. Mean Population of Raided and Non-Raided Settlements Using the Database of City Populations



Notes: This figure replicates Figure 3 using the Database of City Populations from around the World over Time (Biguzzi 2020), an alternative source of time-series data on urban settlement population. The sample comprises 2,228 European settlements in 46 contemporary countries observed between 1100 and 1900. Bars represent 95% confidence intervals; the text above them indicates *t*-statistics from a two-sample *t*-test of the difference in means between raided and non-raided settlements. The lower panels display the total number of raids per year.

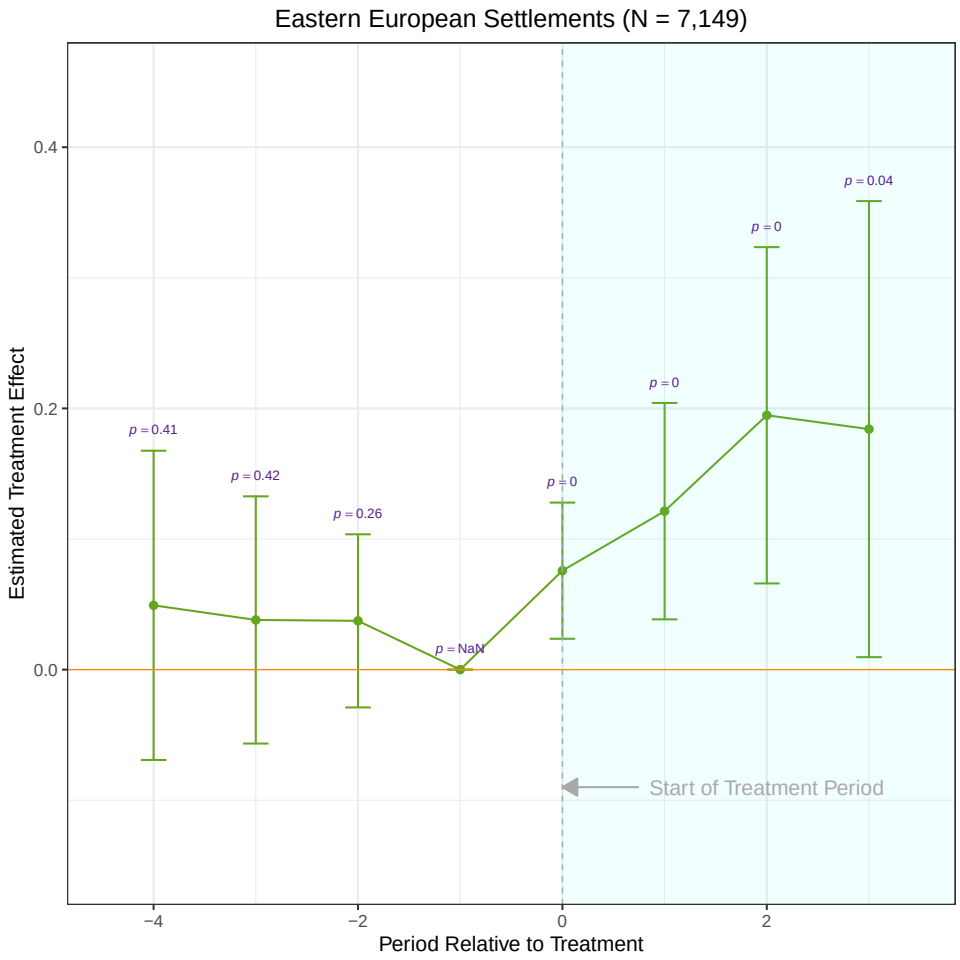
C.2 Robustness

FIGURE A7. Event Study with Full European Sample



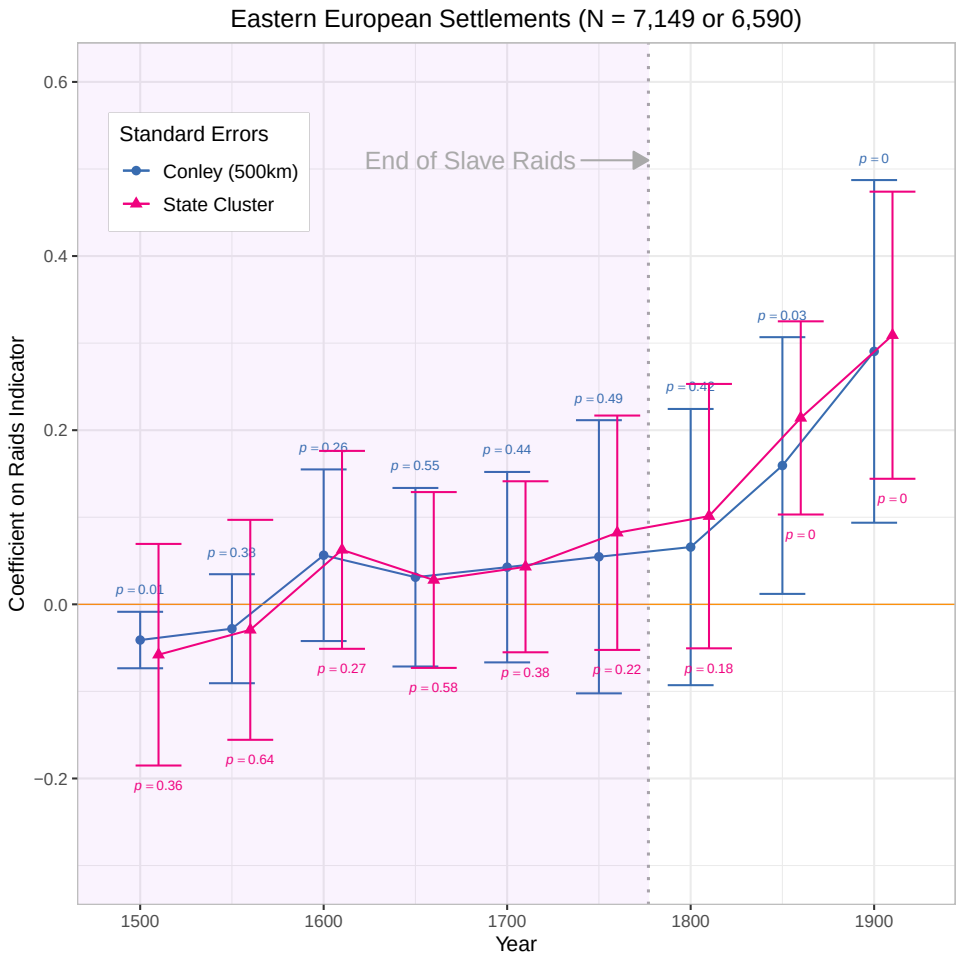
Notes: This figure extends our event study analysis of the impact of nomadic slave raids on urban settlement population (at the settlement-period level) to the whole of Europe. Estimates are computed with two-way fixed effects (TWFE) as well as heterogeneity-robust estimators proposed by Sun and Abraham (2021), Liu, Wang, and Xu (2024), and Callaway and Sant'Anna (2021). The outcome variable is the logarithm of a settlement's population in thousands; the treatment variable is a dummy for the period relative to the first raid on a settlement. The sample comprises 2,262 European settlements observed over 13 periods of 50 or 100 years between 1100 and 1900 (N = 29,405). Bars represent 95% confidence intervals based on robust standard errors clustered by settlement.

FIGURE A8. Event Study with Matching Estimator



Notes: This figure presents event study estimates of the impact of nomadic slave raids on the population of Eastern European urban settlements between 1100 and 1900 (at the settlement-period level) computed with Imai, Kim, and Wang's (2023) matching estimator, which matches treated units to untreated units with similar treatment and outcome histories. The outcome variable is the logarithm of a settlement's population in thousands; the treatment variable is a dummy for the period relative to the first raid on a settlement. The sample comprises 550 settlements observed over 13 periods of 50 or 100 years (N = 7,149). Bars represent 95% confidence intervals based on weighted bootstrapped standard errors clustered by settlement.

FIGURE A9. Urban Population Analysis with Alternative Standard Errors



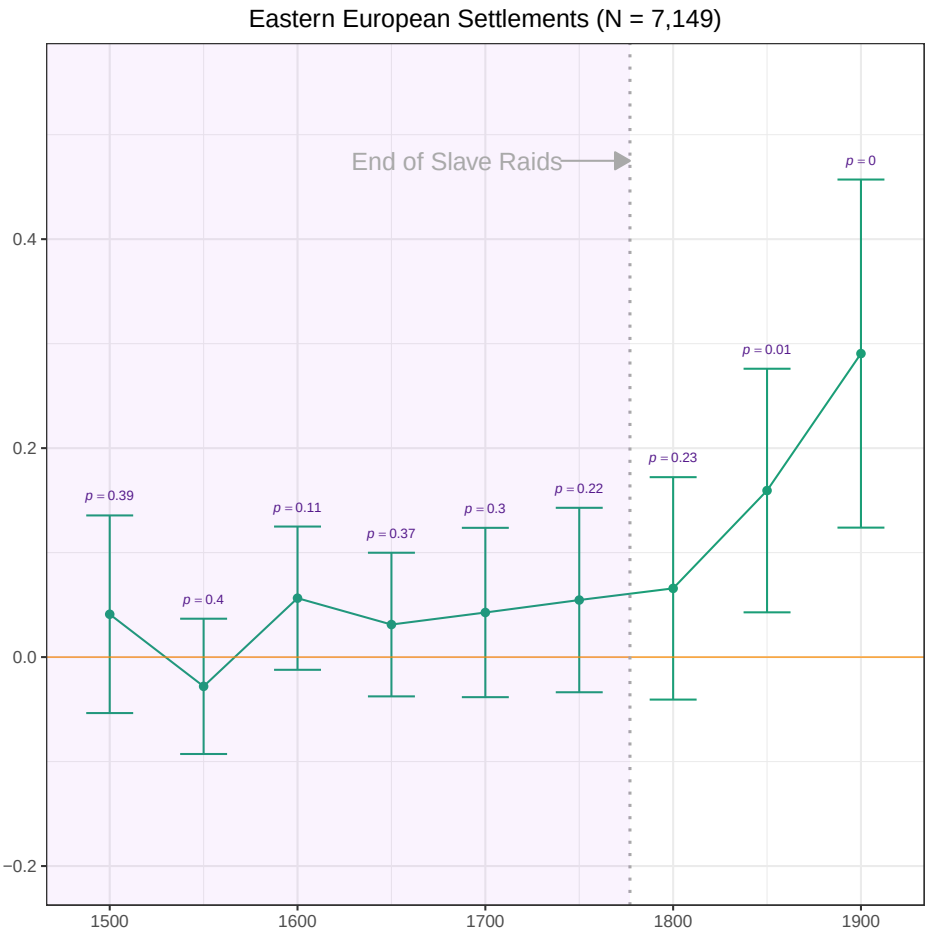
Notes: This figure examines whether our baseline difference-in-differences estimates of the impact of nomadic slave raids on the population of Eastern European urban settlements (at the settlement-period level; Figure 4) are robust to two alternative approaches to computing standard errors: (1) correcting for spatial correlation using Conley standard errors (cutoff = 500km) (Conley 1999); and (2) clustering standard errors by state in 1400. The outcome variable is the logarithm of a settlement's population in thousands; the treatment variable is a dummy for whether a settlement has been raided. The sample comprises 550 settlements observed over 13 periods of 50 or 100 years between 1100 and 1900 (N = 7,149 with the first approach and 6,590 with the second approach). All models include settlement and year fixed effects. Bars represent 95% confidence intervals based on the indicated standard errors; *p*-values reported above or below them.

TABLE A3. Urban Population Analysis with Varying Timeframes

Outcome: Log Settlement Population	Sample Start Date						Sample End Date	
	700	800	900	1000	1200	1300	1950	2000
$\log(R_{st}) \times 1500$	0.042	0.024	0.002	-0.022	-0.060	-0.072	-0.060	-0.091
	(0.053)	(0.051)	(0.049)	(0.048)	(0.051)	(0.057)	(0.053)	(0.059)
$\log(R_{st}) \times 1550$	0.044	0.028	0.010	-0.010	-0.037	-0.037	-0.040	-0.055
	(0.042)	(0.040)	(0.037)	(0.035)	(0.032)	(0.034)	(0.036)	(0.041)
$\log(R_{st}) \times 1600$	0.121***	0.108***	0.092**	0.074**	0.049	0.048	0.048	0.038
	(0.043)	(0.041)	(0.039)	(0.037)	(0.034)	(0.034)	(0.039)	(0.046)
$\log(R_{st}) \times 1650$	0.089**	0.078*	0.063	0.048	0.023	0.019	0.024	0.016
	(0.043)	(0.041)	(0.039)	(0.037)	(0.033)	(0.032)	(0.038)	(0.043)
$\log(R_{st}) \times 1700$	0.112**	0.099**	0.082*	0.063	0.030	0.023	0.039	0.035
	(0.047)	(0.046)	(0.044)	(0.043)	(0.040)	(0.038)	(0.043)	(0.047)
$\log(R_{st}) \times 1750$	0.115**	0.104**	0.089*	0.072	0.045	0.043	0.045	0.037
	(0.051)	(0.050)	(0.048)	(0.047)	(0.043)	(0.041)	(0.047)	(0.050)
$\log(R_{st}) \times 1800$	0.126**	0.115**	0.100*	0.084	0.056	0.055	0.056	0.048
	(0.059)	(0.058)	(0.057)	(0.056)	(0.052)	(0.050)	(0.053)	(0.054)
$\log(R_{st}) \times 1850$	0.218***	0.207***	0.193***	0.177***	0.151***	0.150***	0.149***	0.141**
	(0.064)	(0.063)	(0.062)	(0.061)	(0.058)	(0.056)	(0.056)	(0.055)
$\log(R_{st}) \times 1900$	0.347***	0.336***	0.323***	0.307***	0.283***	0.283***	0.280***	0.270***
	(0.087)	(0.086)	(0.086)	(0.085)	(0.084)	(0.083)	(0.078)	(0.073)
N	9,349	8,799	8,249	7,699	6,599	6,049	7,698	8,247
Mean Outcome Variable	0.995	1.050	1.110	1.174	1.314	1.384	1.422	1.625
Settlement FEs	✓	✓	✓	✓	✓	✓	✓	✓
Year FEs	✓	✓	✓	✓	✓	✓	✓	✓

Notes: This table examines whether our baseline difference-in-differences estimates of the impact of nomadic slave raids on the population of Eastern European urban settlements (at the settlement-period level; Figure 4) are sensitive to different sample timeframes. In columns 2-7, the sample's start date varies between 700 and 1300; in columns 8 and 9, its end date is either 1950 r 2000. The outcome variable, treatment variable, and sources are the same as in Figure 4. Robust standard errors, clustered by settlement, in parentheses. $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

FIGURE A10. Urban Population Analysis with Alternative Slave Trade Start Date



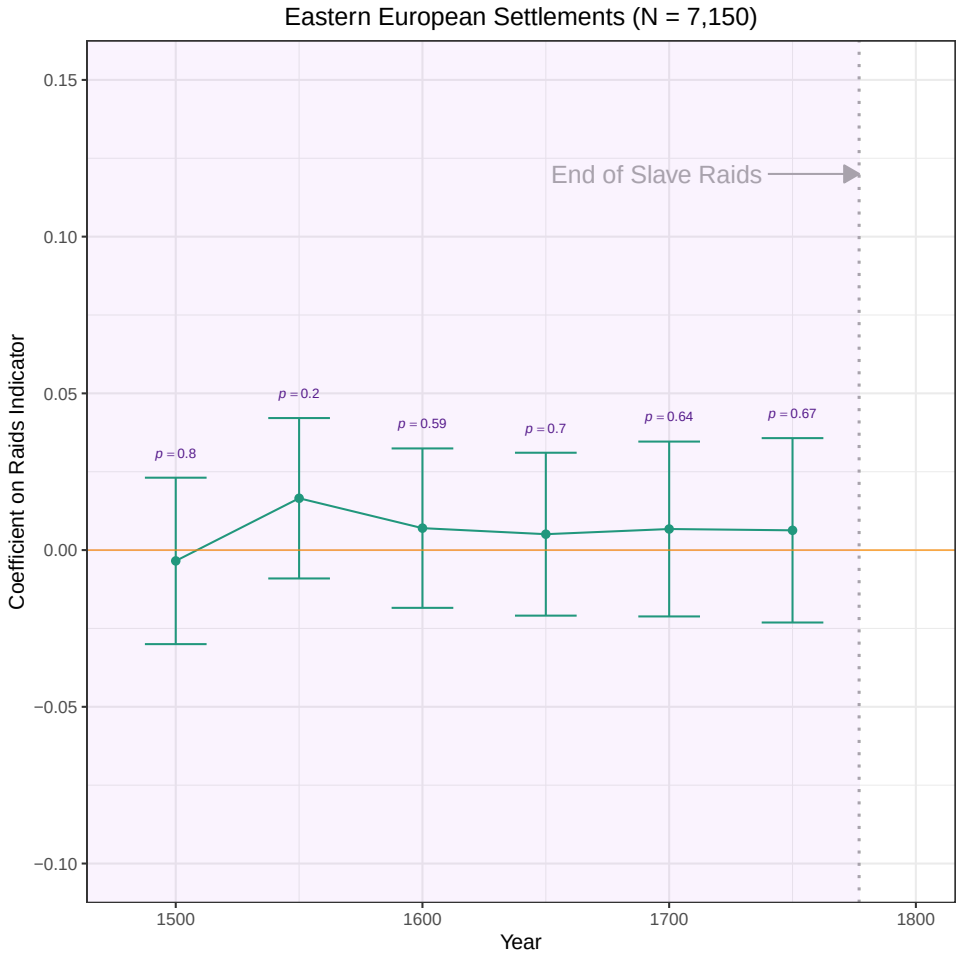
Notes: This figure examines whether our baseline difference-in-differences estimates of the impact of nomadic slave raids on the population of Eastern European urban settlements (at the settlement-period level; Figure 4) are sensitive to treating the 1502 — the dissolution of the Golden Horde — as the start date of the early modern Black Sea slave trade. The outcome variable is the logarithm of a settlement's population in thousands; the treatment variable is a dummy for whether a settlement has been raided. The sample comprises 550 settlements observed over 13 periods of 50 or 100 years between 1100 and 1900 (N = 7,136). All models include settlement and period fixed effects. Bars represent 95% confidence intervals based on robust standard errors clustered by settlement; *p*-values reported above them.

TABLE A4. Urban Population Analysis: Heterogeneity by Initial Settlement Population

Outcome: Log Settlement Population	(1)
$R_{s,1500} \times \text{Post}_{1500} \times \log(P_{s,1400})$	-0.097
	(0.106)
$R_{s,1550} \times \text{Post}_{1550} \times \log(P_{s,1400})$	-0.018
	(0.079)
$R_{s,1600} \times \text{Post}_{1600} \times \log(P_{s,1400})$	0.001
	(0.075)
$R_{s,1650} \times \text{Post}_{1650} \times \log(P_{s,1400})$	0.013
	(0.065)
$R_{s,1700} \times \text{Post}_{1700} \times \log(P_{s,1400})$	0.055
	(0.064)
$R_{s,1750} \times \text{Post}_{1750} \times \log(P_{s,1400})$	0.117
	(0.073)
N	7,149
Mean Outcome Variable	1.243
Settlement FEs	✓
Year FEs	✓

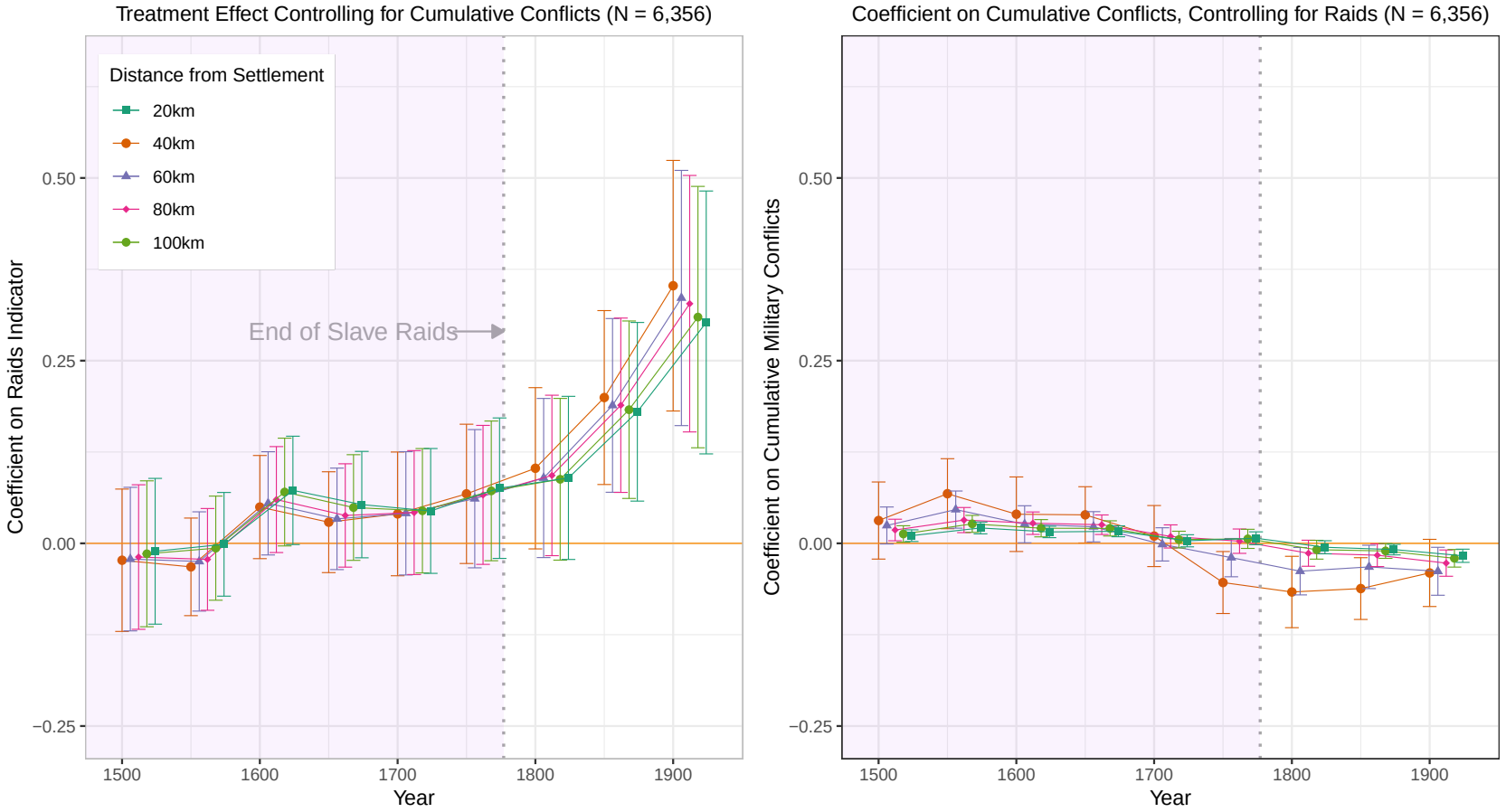
Notes: This table examines whether our baseline difference-in-differences estimates of the impact of nomadic slave raids on the population of Eastern European urban settlements (at the settlement-period level; Figure 4) vary with pre-slave trade population. The sample comprises 550 European settlements observed over 13 periods of 50 or 100 years between 1100 and 1900. The outcome variable, treatment variable, and sources are the same as in Figure 4. Lower-order interaction terms are omitted to save space. Robust standard errors, clustered by settlement, in parentheses. $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

FIGURE A11. Initial Settlement Population and Exposure to Slave Raids



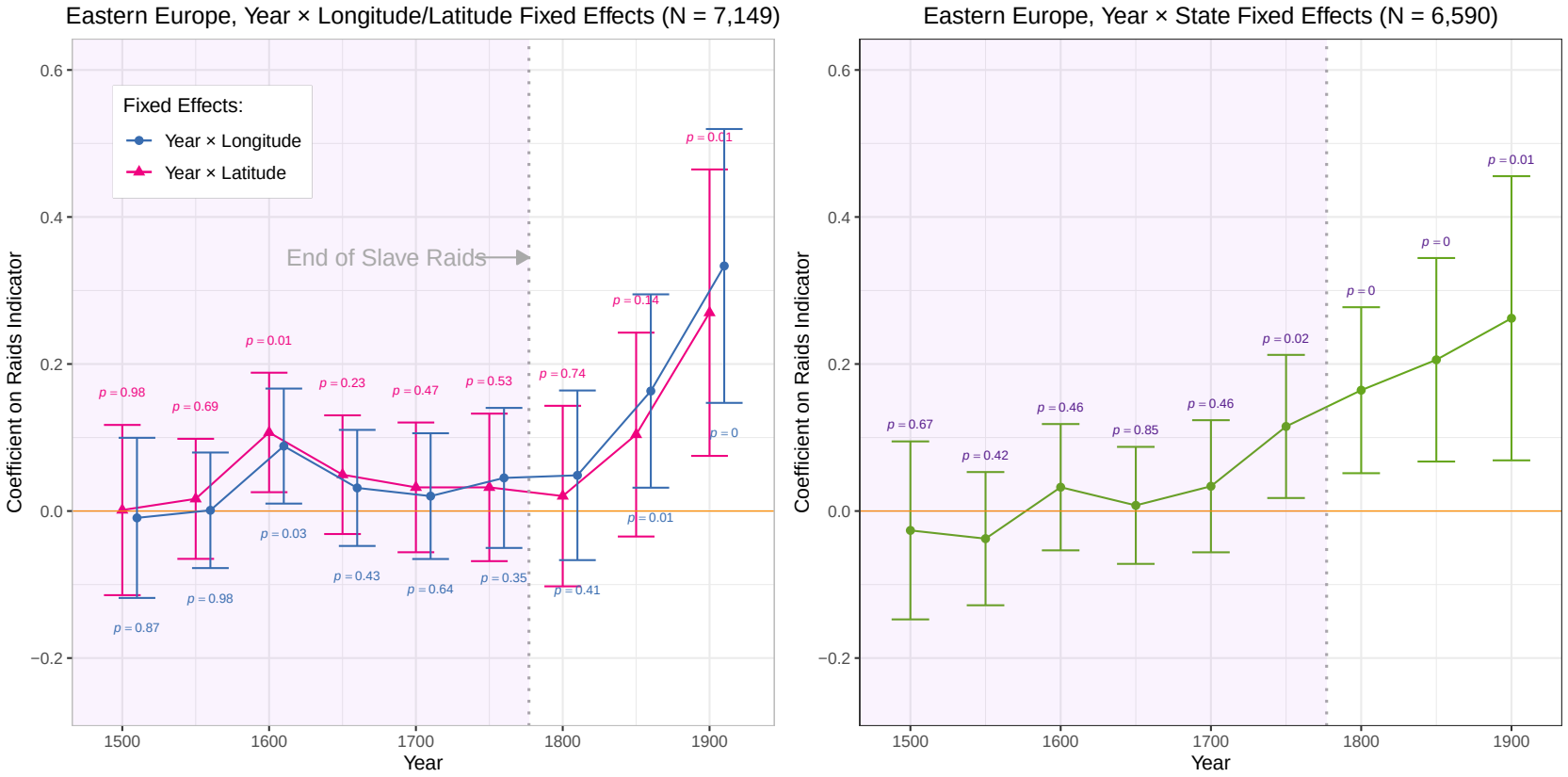
Notes: This figure presents difference-in-differences estimates of the impact of initial urban settlement size on exposure to nomadic slave raids in early modern Eastern Europe at the settlement-period level. The outcome variable is a dummy for whether a settlement has been raided; the treatment variable is the logarithm of a settlement's population in 1400 (i.e., prior to the early modern Black Sea slave trade). The sample comprises 550 settlements observed over 13 periods of 50 or 100 years between 1100 and 1900 (N = 7,150). All models include settlement and period fixed effects. Bars represent 95% confidence intervals based on robust standard errors clustered by settlement; *p*-values reported above them.

FIGURE A12. Urban Population Analysis Controlling for Military Conflict



Notes: This figure examines whether our baseline difference-in-differences estimates of the impact of nomadic slave raids on the population of Eastern European urban settlements (at the settlement-period level; Figure 4) are robust to controlling for regular military conflicts. The outcome variable is the logarithm of a settlement's population in thousands; the treatment variable is a dummy for whether a settlement has been raided. The sample comprises 2,262 European settlements observed over 13 periods of 50 or 100 years between 1100 and 1900 (N = 6,356). All models include settlement and year fixed effects as well as cumulative military conflicts within a specified distance from a settlement (as per the legend). Bars represent 95% confidence intervals based on robust standard errors clustered by settlement; *p*-values reported above them. Data on conflicts come from the Historical Conflict Event Dataset (Miller and Bakar 2023).

FIGURE A13. Urban Population Analysis with Interactive Fixed Effects

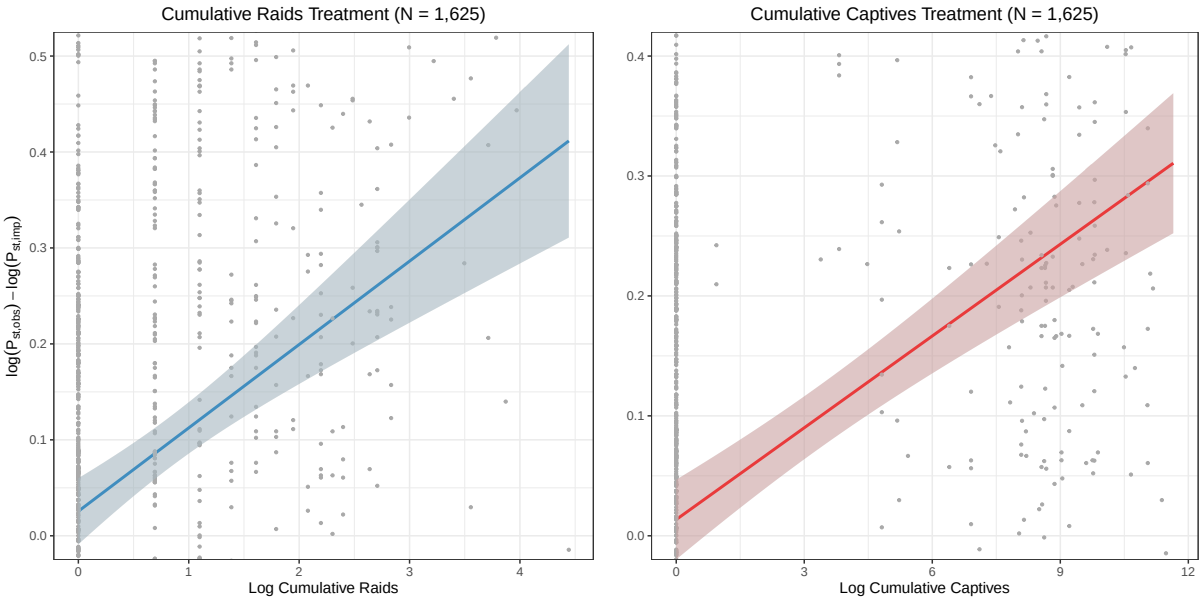


Notes: This figure examines whether our baseline difference-in-differences estimates of the impact of nomadic slave raids on the population of Eastern European urban settlements (at the settlement-period level; Figure 4) are robust to the inclusion of interactive year × longitude fixed effects (left panel), year × latitude fixed effects (left panel), and year × state in 1400 fixed effects (right panel). The outcome variable is the logarithm of a settlement's population in thousands; the treatment variable is a dummy for whether a settlement has been raided. The sample comprises 2,262 European settlements observed over 13 periods of 50 or 100 years between 1100 and 1900 (N = 7,149 in the left panel and 6,590 in the right panel). All models include settlement as well as the interactive fixed effects. Longitude and latitude are rounded to the nearest integer. Bars represent 95% confidence intervals based on robust standard errors clustered by settlement; *p*-values reported above or below them.

C.3 Extensions

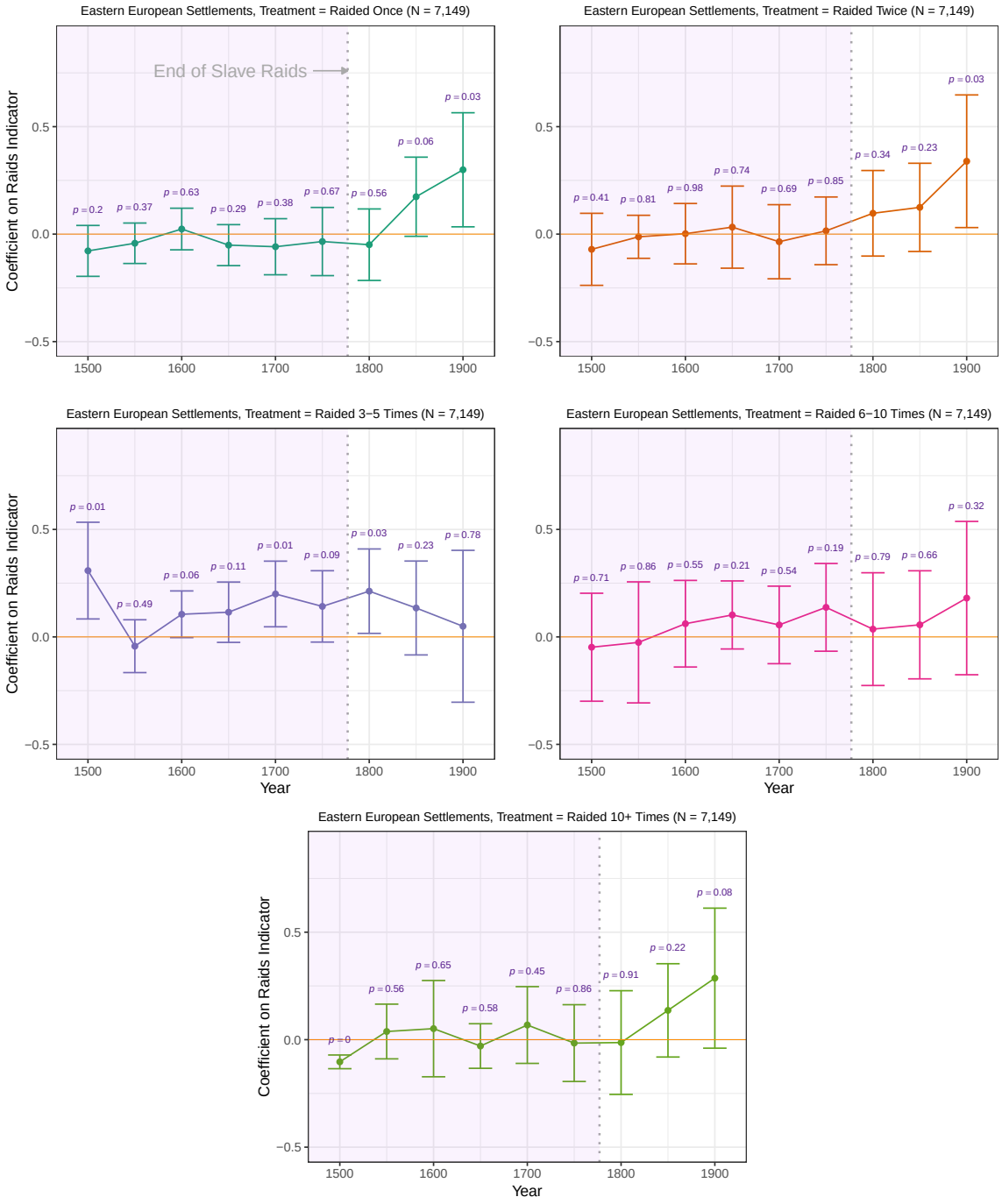
C.3.1 Continuous Treatment

FIGURE A14. Relationship between Continuous Treatment Variables and Observed-Counterfactual Outcome Differences



Notes: This figure probes the plausibility of the "strong parallel trends" assumption (Callaway, Goodman-Bacon, and Sant'Anna 2024) in our continuous difference-in-differences analysis of the impact of nomadic slave raids on the population of Eastern European urban settlements (at the settlement-period level). The *x*-axis measures the logarithm of cumulative raids on a settlement in the left panel and the logarithm of cumulative captives taken from a settlement in the right panel. The *y*-axis measures the difference between observed and imputed counterfactual values of the logarithm of settlement population, as computed with Liu, Wang, and Xu's (2024) fixed effects counterfactual estimator. The sample comprises 125 raided Eastern European settlements observed over 13 periods of 50 or 100 years between 1100 and 1900 (N = 1,625). Each panel displays a linear regression line with shaded 95% confidence intervals.

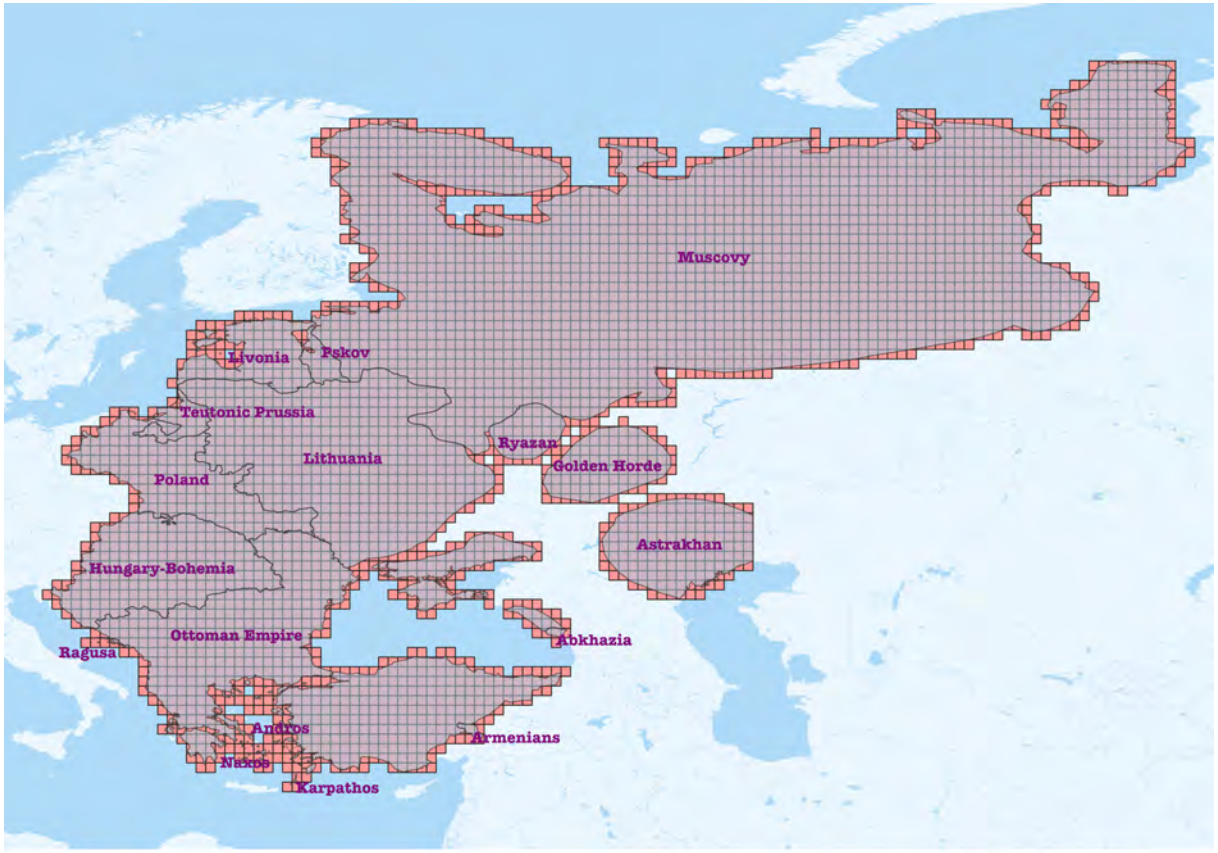
FIGURE A15. Marginal Effects of Repeated Raids



Notes: This figure presents difference-in-differences estimates of the impact of repeated nomadic slave raids on the population of Eastern European urban settlements (at the settlement-period level). The outcome variable is the logarithm of a settlement's population in thousands; the treatment variable is a dummy for whether a settlement has been raided twice (top left panel), three times (top right), 3-5 times (middle left), 6-10 times (middle right), and more than 10 times (bottom). The sample comprises 550 settlements observed over 13 periods of 50 or 100 years between 1100 and 1900 (N = 7,149). All models include settlement and year fixed effects. Bars represent 95% confidence intervals based on robust standard errors clustered by settlement.

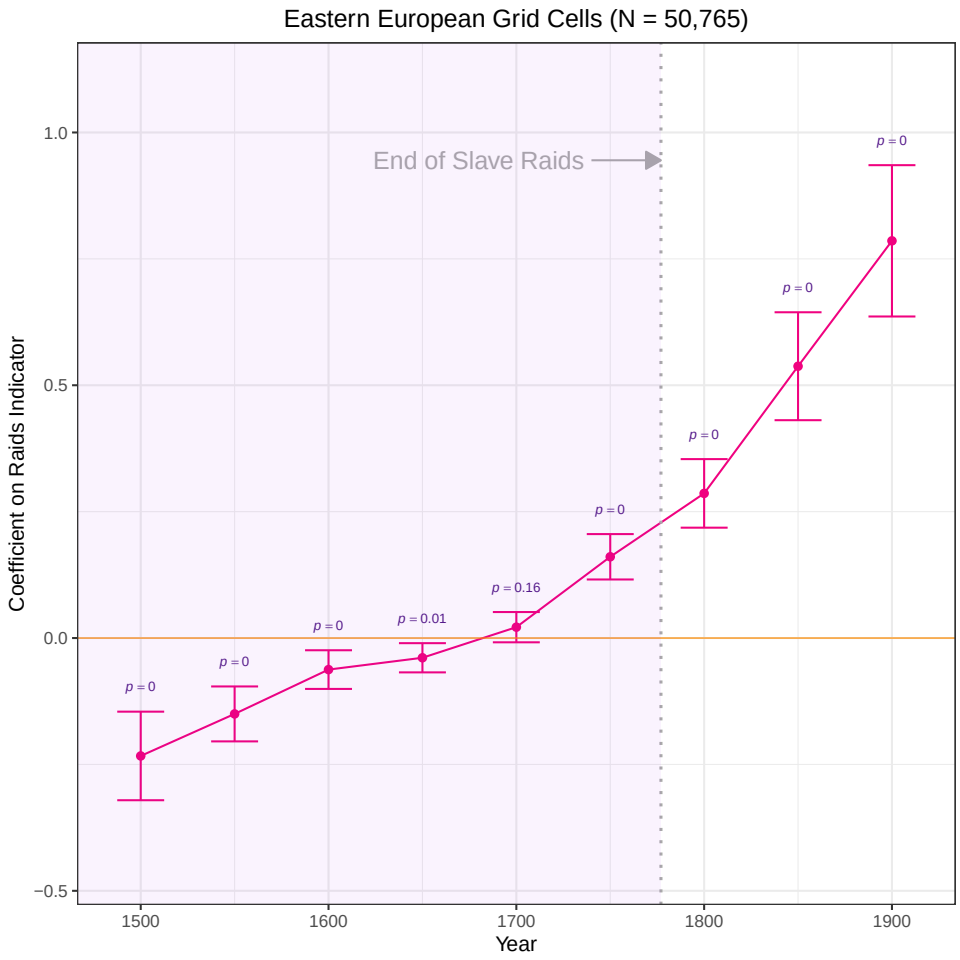
C.3.2 Grid Cell Analysis

FIGURE A16. Map of Raided States with Grid Cells, 1505 Borders



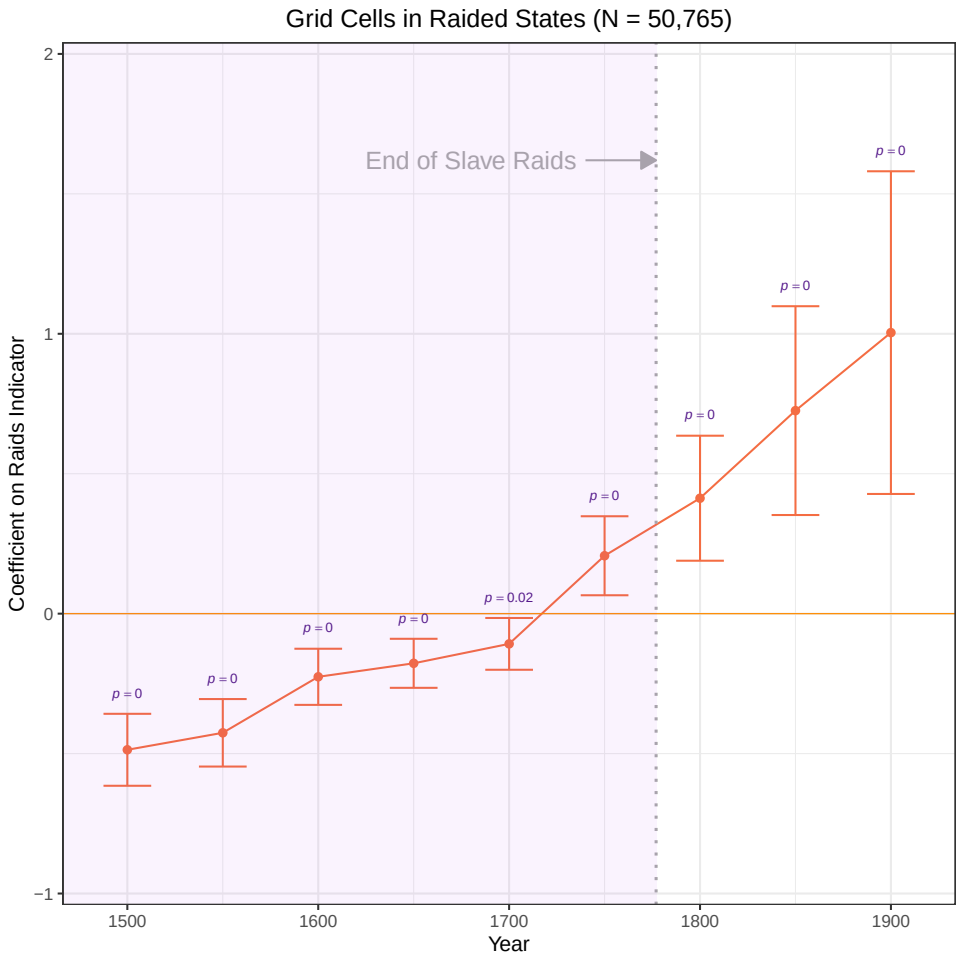
Notes: This map displays the spatial units in our grid-cell-level analysis of the impact of nomadic slave raids on the population of European settlements (the results of which are presented in A17). The 3,905 grid cells measure 0.5×0.5 decimal degrees, which is roughly 50km×50km at the equator. State borders are from 1505. Grid cells are from the PRIO-GRID dataset (Tollefsen, Strand, and Buhaug 2012).

FIGURE A17. Urban Population Analysis at Grid Cell Level



Notes: This figure examines whether our baseline difference-in-differences estimates of the impact of nomadic slave raids on the population of Eastern European urban settlements (Figure 4) are robust to using grid cells as the unit of observation. The outcome variable is the logarithm of a grid cell's urban population; the treatment variable is a dummy for whether a grid cell has been raided. The sample comprises 3,905 grid cells measuring 0.5°×0.5° (roughly 50km×50km at the equator) — shown in Figure A16 — observed over 13 periods of 50 or 100 years between 1100 and 1900 (N = 50,765). All models include grid cell, state, and year fixed effects. Bars represent 95% confidence intervals based on robust standard errors clustered by grid cell; *p*-values reported above them. Grid cells are from the PRIO-GRID dataset (Tollefsen, Strand, and Buhaug 2012).

FIGURE A18. Analysis of Urban Population Spillovers at Grid Cell Level



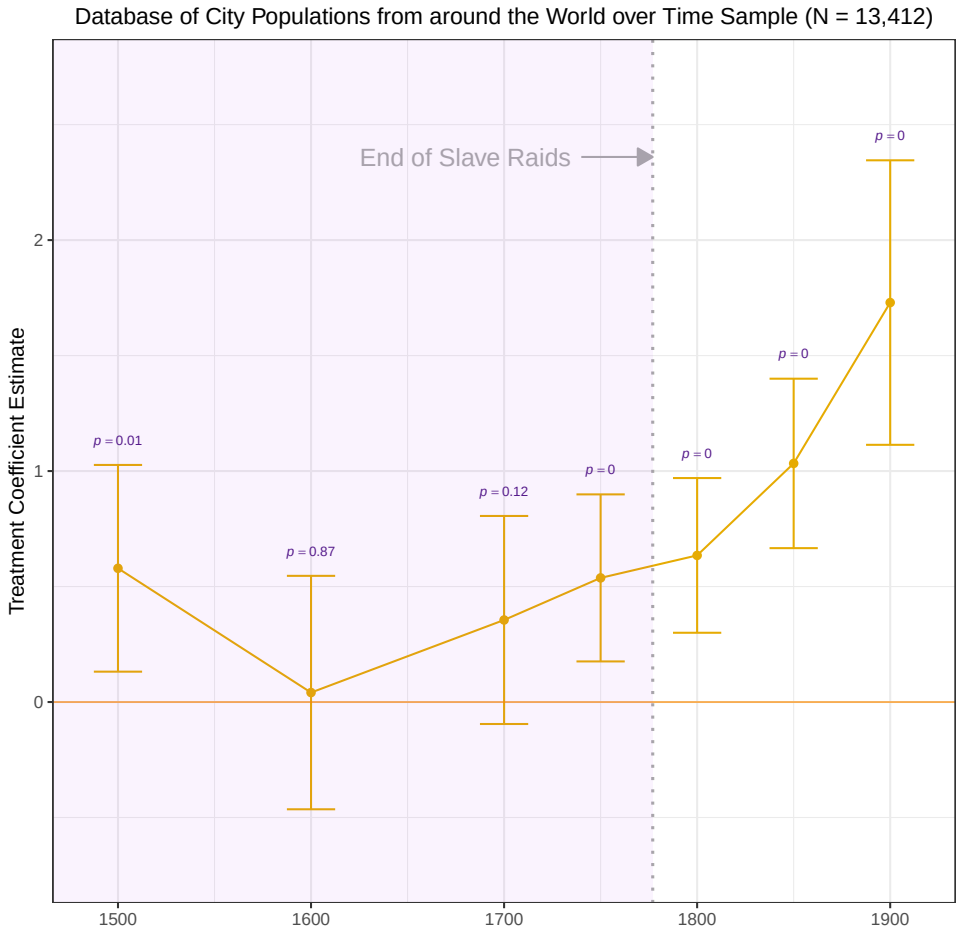
Notes: This figure presents difference-in-differences estimates of the impact of nomadic slave raids on the population of nearby urban settlements at the grid cell-period level. The outcome variable is the logarithm of a grid cell's urban population; the treatment variable is a dummy for whether an adjacent grid cell was raided in the previous period. The sample comprises 3,905 grid cells measuring 0.5°×0.5° (roughly 50km×50km at the equator) — shown in Figure A16 — observed over 13 periods of 50 or 100 years between 1100 and 1900 (N = 50,765). All models include a dummy for whether a grid cell was itself raided plus grid cell, state, and year fixed effects. Bars represent 95% confidence intervals based on robust standard errors clustered by grid cell; *p*-values reported above them. Grid cells are from the PRIO-GRID dataset (Tollefsen, Strand, and Buhaug 2012).

FIGURE A19. Analysis of Urban Settlement Density at Grid Cell Level

Notes: This figure presents difference-in-differences estimates of the impact of nomadic slave raids on the density of Eastern European urban settlements at the grid cell-period level. The outcome variable is the number of urban settlements with at least 1,000 inhabitants in the top row, at least 5,000 inhabitants in the middle row, and at least 10,000 inhabitants in the bottom row; the treatment variable is a dummy for whether a grid cell has been raided. The sample comprises 3,905 grid cells measuring 0.5°×0.5° (roughly 50km×50km at the equator) — shown in Figure A16 —observed over 13 periods of 50 or 100 years between 1100 and 1900 (N = 50,765). All models include grid cell, state, and year fixed effects. Bars represent 95% confidence intervals based on robust standard errors clustered by grid cell; *p*-values reported above them. Grid cells are from the PRIO-GRID dataset (Tollefsen, Strand, and Buhaug 2012).

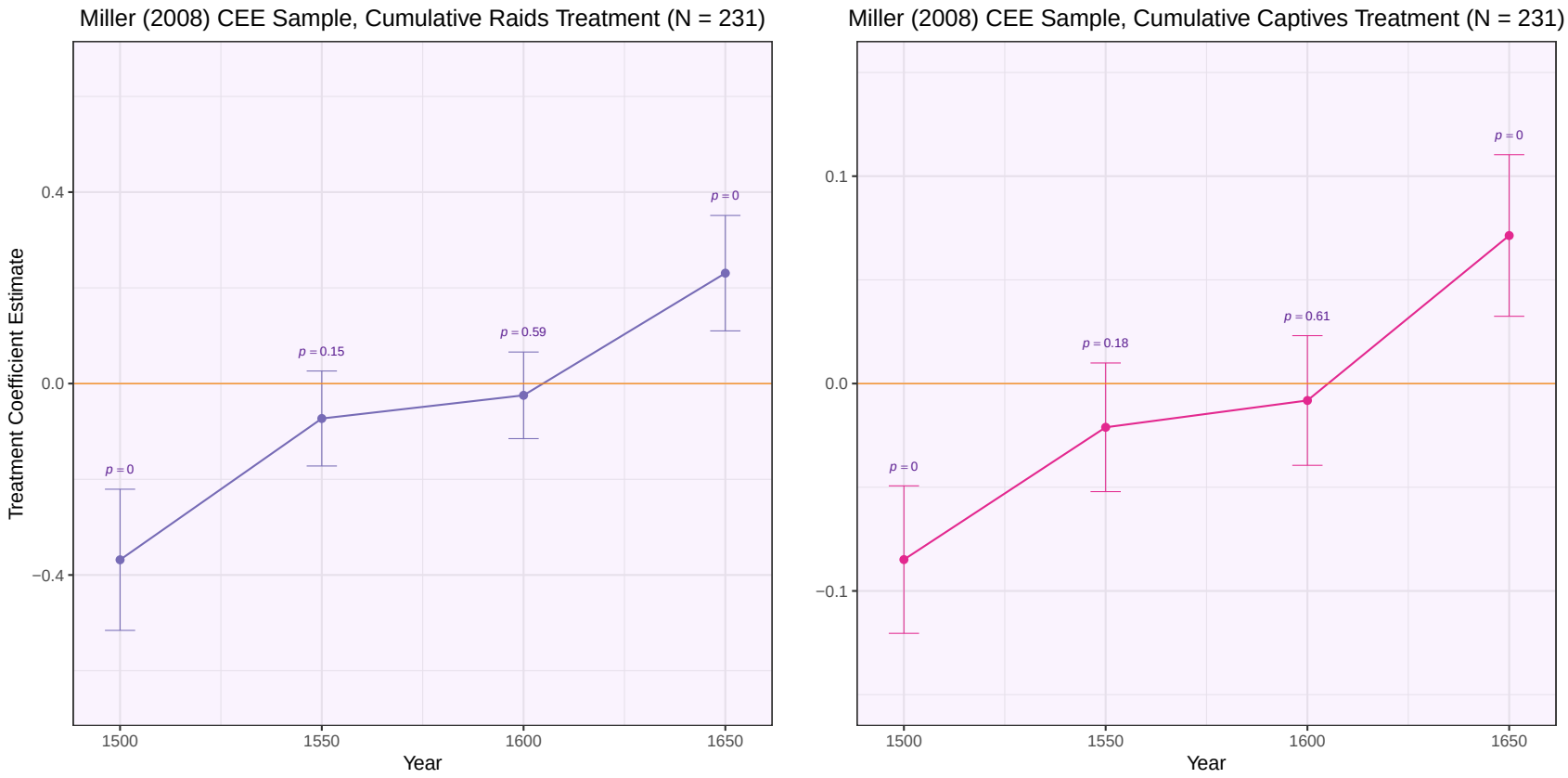
C.3.3 Alternative Data Sources

FIGURE A20. Urban Population Analysis Using Database of City Populations



Notes: This figure examines whether our baseline difference-in-differences estimates of the impact of nomadic slave raids on the population of European urban settlements (at the settlement-period level; Figure 4) are robust to measuring the latter using the Database of City Populations around the World over Time (Biguzzi 2020). The outcome variable is the logarithm of a settlement's population in thousands; the treatment variable is a dummy for whether a settlement has been raided. The sample comprises 2,228 European settlements in 46 contemporary countries observed over 11 periods from 1100 to 1900 (N = 13,412). All models include settlement and year fixed effects. Bars represent 95% confidence intervals based on robust standard errors clustered by settlement; *p*-values reported above them.

FIGURE A21. Urban Population Analysis Using Miller (2008) Central Eastern European Sample



Notes: This figure examines the relationship between nomadic slave raids and the population of around 100 urban settlements in Central Eastern Europe, as measured by Miller (2008), at the settlement-period level. The outcome variable is the logarithm of a settlement's population; the treatment is the logarithm of cumulative raids on a settlement in the left panel and the logarithm of cumulative captives taken from a settlement in the right panel. The sample comprises 95 European settlements in the Lands of the Bohemian Crown, the Poland-Lithuanian Commonwealth, and the Kingdom of Hungary observed over four periods between 1500 and 1650 (N = 231). All models include settlement, state, and year fixed effects. Bars represent 95% confidence intervals based on robust standard errors clustered by settlement; *p*-values reported above them.

D Long-Run Development in Imperial Russia and Austria

D.1 Constructing Least-Cost Raiding Paths

This section provides a more detailed description of our algorithm for computing least-cost nomadic raiding paths, which provide the basis for our instrument for raid exposure (in the second part of our empirical investigation). The algorithm, which comprises four stages, is implemented using the QGIS geographic information system (v3.30.3). Table A5 presents a pseudocode summary.

The first step is preprocessing. The algorithm's input is a pre-calculated flow accumulation cost raster with a resolution of 30 arc-seconds (approximately 1km), acquired from the HydroSHEDS database.[4] Raster values represent the accumulated flow in a given cell, that is, the volume of water that enters this cell from upstream areas (assuming that all cells receive the same volume of rainfall and that there is no evaporation or subsurface flow). This is a function of the size of its drainage basin, which, in turn, depends on its elevation and gradient. We start by reprojecting the raster from the WGS 84 coordinate system to the Albers equal area conic map, resampling values using a cubic (4×4 kernel) convolution approximation. The latter method is better able to handle areas of internal drainage than the more common nearest neighbor approach, yielding a closer fit to the four major nomadic trails (the Woloski Trail, the Czarny Trail, the Kuczman Trail, and the Murawa Trail).

Second, following Matranga and Natkhov (2022), we make a few small adjustments to the reprojected raster. Since flow accumulation data are skewed to the right — mainly because cells representing river mouths and estuaries receive far more water than others — we take the square root of all values. In making this transformation, we convert cells representing ocean from null values to the maximum value to prevent negative square roots and ensure that these areas are sufficiently penalized in the least-cost path calculation. To save memory and speed up the algorithm, we then clip the raster to exclude regions outside Eastern Europe (including western and northern Russia).

Third, using Dijkstra's (1959) shortest path algorithm, we compute three least-cost paths between the sources and destination points of the nomadic trails mentioned above: (1) Perekop to Moscow; (2) Perekop to Lviv, and (3) Akkerman to Lviv.[5] In brief, this involves creating two new rasters: a "cost distance" raster that encodes the least accumulated cost of traveling from the source to all other cells in the raster; and a "backlink" raster that encodes the direction from each cell to its least-cost neighbor. By combining the two grids, a path is then traced from the destination back to the source via the most efficient combination of least-cost neighbors.

Fourth, we compute the next three least-cost paths between each source-destination pair, gener-

[4] See https://www.hydrosheds.org/hydrosheds-core-downloads.

[5] We implement this algorithm with the QGIS Least-Cost Path plugin, accessed from: https://plugins.qgis.org/plugins/leastcostpath/.

TABLE A5. Algorithm Pseudocode for Generating Least-Cost Raiding Paths

Data : Flow accumulation cost raster $\mathbf{R}$, source s, destination d
Result: N least-cost paths from s to d
begin
  Reproject $\mathbf{R}$ onto Albers equal area map using cubic resampling;
  Set oceanic null values in $\mathbf{R}$ to maximum;
  Clip $\mathbf{R}$ around Eastern Europe;
  foreach *s-d* pair Perekop-Moscow, Perekop-Lviv, Akkerman-Lviv **do**
    Construct cost distance raster $\mathbf{R}^{D}_{sd,1}$;
    Construct backlink raster $\mathbf{R}^{B}_{sd,1}$;
    Combine $\mathbf{R}^{D}_{sd,1}$ and $\mathbf{R}^{B}_{sd,1}$ to generate least-cost path $p_{sd,1}$ from d to s;
  end
  repeat
    foreach $i = 2, \ldots, n$ **do**
      Create 15km buffer around least-cost path $p_{sd,i-1}$;
      Assign penalty of 200 to cells within buffer zone;
      Construct cost distance raster $\mathbf{R}^{D}_{sd,i}$;
      Construct backlink raster $\mathbf{R}^{B}_{sd,i}$;
      Combine $\mathbf{R}^{D}_{sd,i}$ and $\mathbf{R}^{B}_{sd,i}$ to generate least-cost path $p_{sd,i}$ from d to s;
    end
  until $n + 1$ *least-cost paths generated*;
  From $p_{sd,1}, \ldots, p_{sd,n+1}$, select N paths that best approximate actual nomadic trails
end

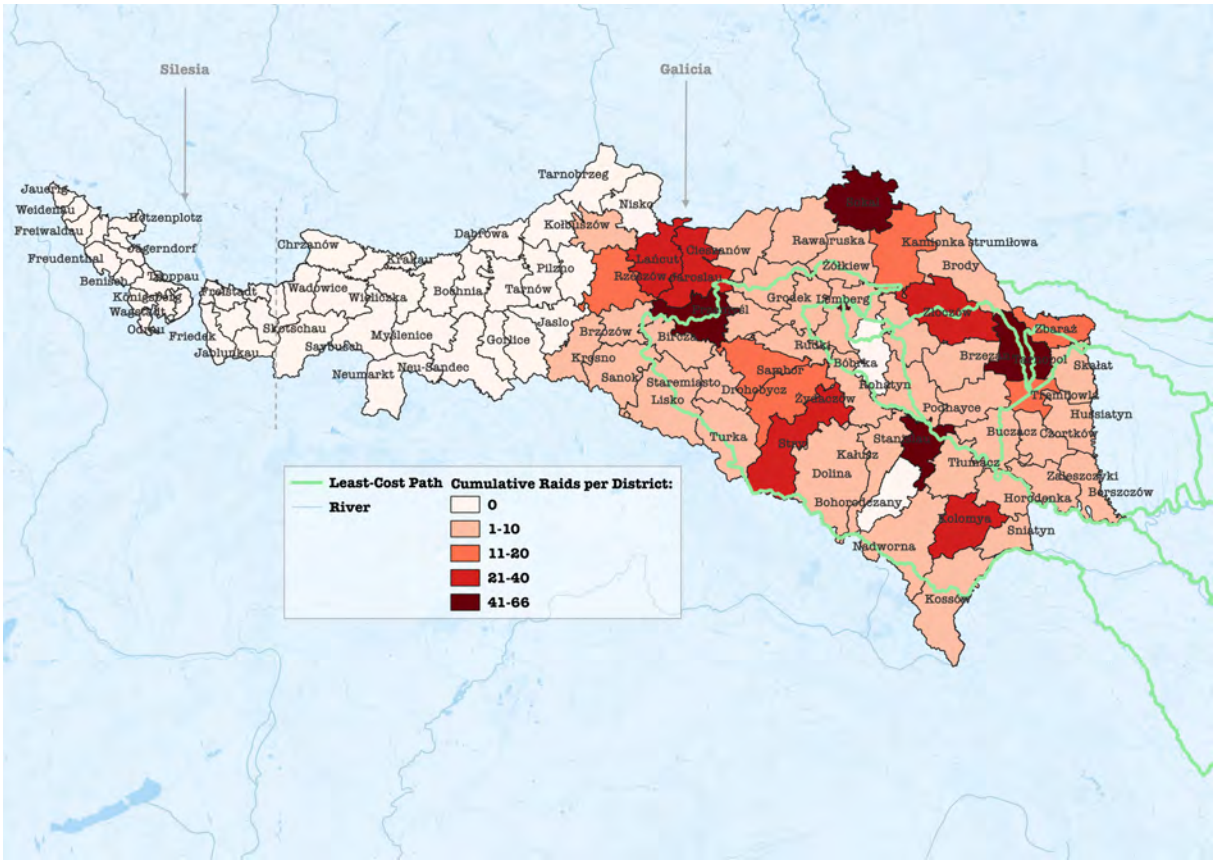
Notes: This table describes our algorithm for generating least-cost nomadic raiding paths in pseudocode form. The algorithm is executed in the QGIS geographic information system (v.3.30.3).

ating 12 paths in total. This is achieved by constructing a 15km buffer around every more efficient path (with flat end caps); assigning a "burn-in" value (or penalty) of 200 to cells within this zone; and rerunning the Dijkstra algorithm.

Finally, among the 12 computed paths, we select the nine that most closely resemble a real nomadic trail. For the Akkerman-Lviv and Perekop-Moscow pairs, the top three least-cost paths provide the best approximation; in the Perekop-Lviv case, the third least-cost path diverges substantially from every trail, extending deep into Russia before running east toward Minsk and then bending south. We thus choose the first, second, and fourth least-cost paths, all of which have a similar shape to the Czarny Trail. The nine selected paths are mapped in Figure 7.

D.2 Map of Austrian Galicia and Silesia

FIGURE A22. Districts of Austrian Galicia and Silesia, Mid-19th Century



Notes: This map displays the 99 districts (*Kreise*) of Galicia and Silesia, provinces of the mid-19th century Austrian Empire located in contemporary southeastern Poland and western Ukraine. Silesia lies to the west of Galicia's Wadowice district (indicated by the dotted line). As per the legend, blue lines represent rivers, thick green lines represent least-cost paths from Perekop or Akkerman to Lviv, and districts are shaded by the cumulative number of nomadic slave raids on them.

D.3 Summary Statistics

TABLE A6. Summary Statistics for Imperial Russia Analysis

Statistic	N	Mean	St. Dev.	Min	Max
Panel A: Treatment and Instruments					
Log Cumulative Raids	375	0.710	1.030	0	5
Distance to Least-Cost Path (km)	375	287.614	293.277	0.375	1,545.114
Distance to Placebo Least-Cost Path (km)	375	287.614	293.277	0.375	1,545.114
Distance to Watershed Boundary (km)	374	2,354,944	1,096,256	299,584	6,000,886
Log Distance to Watershed Boundary (km)	374	7.644	0.518	5.702	8.700
Panel B: Outcomes					
Log Urban Population (1863)	358	8.734	0.924	6.349	12.770
Population per km^2 (1897)	372	42.506	32.288	0.099	503.103
Markets per 1k Population	356	0.119	0.111	0.000	0.756
Markets per km^2 (1867)	362	0.003	0.004	0.000	0.022
Factories per 1k Population	357	0.240	0.485	0.000	4.157
Factories per km^2 (1868)	363	0.006	0.017	0.000	0.229
State Officials per 1k Population (1897)	357	0.482	0.366	0.094	2.995
State Officials per km^2 (1897)	357	0.017	0.014	0.0001	0.097
Military Officials per 1k Population (1897)	357	0.081	0.320	0.000	4.237
Military Officials per km^2 (1897)	357	1.497	5.086	0.000	52.334
Arrears/Tax Owed (1893-95)	356	0.380	0.724	0.000	4.142
Panel C: Controls					
Mean Terrain Ruggedness	375	26.353	11.609	8.454	83.723
Distance to Moscow (km)	375	568.389	293.636	0.000	1,574.536
Log Urban Population in 1400 (k)	375	0.243	0.482	0	3
Cumulative Military Conflicts (1453-1777)	375	0.259	0.787	0	8
Log Area (km^2)	375	8.504	0.792	7.161	12.702
Minimum Distance to Coastline (km)	375	472.282	251.293	2.937	1,147.398
Mean Seasonality (SD$\times$100)	375	959.357	100.697	733.383	1,215.760
Fertile Soil (Share)	375	0.320	0.360	0.000	1.000
Mean Precipitation (mm)	375	613.221	45.665	488.121	800.286
Minimum Distance to River (km)	375	44.849	35.421	0.033	194.776

Notes: This table presents summary statistics for variables in our district-level analysis of long-run development and defensive state capacity in Imperial Russia in the mid-19th century.

TABLE A7. Summary Statistics for Analysis of Austrian Galicia and Silesia

Statistic	N	Mean	St. Dev.	Min	Max
Panel A: Treatment and Instruments					
Log Cumulative Raids	99	1.218	1.266	0.000	4.205
Distance to Least-Cost Path (km)	99	97.986	120.828	0.000	366.738
Distance to Watershed Boundary (km)	99	1,254,531	385,827	657,732	1,925,331
Panel B: Outcomes					
Log Population	99	10.813	0.670	9.049	11.668
Population per km^2	99	191.673	874.065	28.165	8,354.780
Log Houses	99	8.911	0.734	6.519	9.891
Houses per km^2	99	14.663	20.642	3.518	199.334
Log Farm Structures	99	9.277	0.762	6.696	10.291
Farm Structures per km^2	99	20.018	22.421	6.095	217.441
Panel C: Controls					
Log Land Area (km^2)	99	6.445	0.990	1.941	7.830
Mean Terrain Ruggedness	99	101.369	72.770	14.885	297.071
Log Urban Population in 1400 (k)	99	0.110	0.349	0.000	2.398
Log Distance to Coastline (km)	99	6.241	0.100	5.991	6.439
Fertile Soil (Share)	99	0.214	0.360	0.000	1.000
Minimum Distance to River (km)	99	0.246	1.404	0.000	8.846
Cumulative Military Conflicts (1453-1777)	99	0.141	0.495	0	3

Notes: This table presents summary statistics for variables in our district-level analysis of long-run development in Austrian Galicia and Silesia in the mid-19th century.

D.4 Full Regression Results

TABLE A8. Slave Raids and Long-Run Development Outcomes in Imperial Russia: Full Estimates

Outcomes:	Population		Markets		Factories	
	Log Urban	Per km^2	Log Total	Per km^2	Log Total	Per km^2
	(1)	(2)	(3)	(4)	(5)	(6)
Log Cumulative Raids	0.363***	13.926***	0.516***	0.002***	0.304	0.005**
(Instrumented)	(0.136)	(4.257)	(0.189)	(0.001)	(0.215)	(0.003)
Distance to Rivers	-0.0001	0.013	-0.00004	0.00000	0.0005	0.00002
	(0.001)	(0.041)	(0.002)	(0.00001)	(0.002)	(0.00003)
Distance to Moscow	-0.00003	0.006	0.0003	0.00000	-0.0002	-0.00001
	(0.0003)	(0.008)	(0.0004)	(0.00000)	(0.0004)	(0.00001)
Fertile Soil	-0.391	-5.419	-0.305	-0.0004	-1.163***	-0.014**
	(0.274)	(9.093)	(0.378)	(0.001)	(0.430)	(0.005)
Mean Terrain Ruggedness	0.010**	0.277*	-0.002	-0.00000	0.012	0.0001
	(0.005)	(0.167)	(0.007)	(0.00002)	(0.008)	(0.0001)
Log Urban Population in 1400	0.616***	15.816***	-0.429***	-0.001***	0.497***	0.008***
	(0.107)	(3.477)	(0.146)	(0.0004)	(0.166)	(0.002)
Cumulative Military Conflicts	0.098*	1.455	0.079	0.00002	0.134	0.0001
	(0.059)	(1.919)	(0.080)	(0.0002)	(0.092)	(0.001)
Log Land Area	-0.171*	-19.357***	-0.066	-0.002***	-0.040	-0.004**
	(0.096)	(2.925)	(0.132)	(0.0004)	(0.151)	(0.002)
Distance to Coast	-0.001	-0.032**	-0.001**	-0.00001***	-0.0005	-0.00001
	(0.0004)	(0.013)	(0.001)	(0.00000)	(0.001)	(0.00001)
Temperature Seasonality	0.0005	0.092**	0.007***	0.00003***	0.001	0.00005
	(0.001)	(0.047)	(0.002)	(0.00001)	(0.002)	(0.00003)
Mean Precipitation	-0.001	-0.008	0.0005	0.00000	0.001	-0.00001
	(0.001)	(0.040)	(0.002)	(0.00001)	(0.002)	(0.00002)
N	358	372	362	362	363	363
R^2	0.344	0.416	0.027	0.299	0.248	0.181
Mean Outcome Variable	8.734	42.506	2.163	0.003	2.322	0.006
State FEs (1505 Borders)	✓	✓	✓	✓	✓	✓
First-Stage F-Statistic	55.425	63.051	54.899	54.899	55.445	55.445

Notes: This table presents full second-stage 2SLS estimates of the impact of nomadic slave raids on district-level development outcomes in mid-19th century imperial Russia. The treatment variable is the logarithm of cumulative raids on a district, instrumented by its minimum distance to nine least-cost paths from the northern Black Sea coast to Lviv and Moscow. Robust standard errors in parentheses. $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

TABLE A9. Slave Raids and Long-Run Development Outcomes in Austrian Galicia and Silesia: Full Estimates

Outcomes:	Population		Houses		Farm Structures	
	Log Total	Per km^2	Log Total	Per km^2	Log Total	Per km^2
	(1)	(2)	(3)	(4)	(5)	(6)
Log Cumulative Raids	0.655***	1,025.445***	0.323**	23.901***	0.164	24.319***
(Instrumented)	(0.193)	(235.212)	(0.135)	(7.212)	(0.114)	(7.895)
Log Urban Population in 1400	0.096	-460.771***	0.096	-8.293**	0.086***	-8.082**
	(0.112)	(140.346)	(0.088)	(4.091)	(0.023)	(3.882)
Mean Terrain Ruggedness	0.000	2.053	-0.001	0.037	-0.002	0.022
	(0.001)	(1.280)	(0.001)	(0.029)	(0.001)	(0.028)
Log Land Area	0.299**	-810.134***	0.594***	-20.468***	0.660***	-22.169***
	(0.136)	(271.169)	(0.093)	(3.992)	(0.056)	(4.246)
Soil Quality	-0.605*	-1,032.952**	-0.219	-23.016*	-0.111	-23.853*
	(0.347)	(458.632)	(0.311)	(12.102)	(0.190)	(12.984)
Log Distance to River	0.056	-28.063	0.055*	-0.027	0.042	0.119
	(0.048)	(176.184)	(0.033)	(2.838)	(0.027)	(3.349)
Log Distance to Coastline	-1.641***	-2,172.177***	-1.747***	-63.172***	-0.437***	-54.181***
	(0.121)	(221.996)	(0.076)	(3.452)	(0.056)	(3.635)
Cumulative Military	-0.134	-90.194	-0.046	-3.845	0.033	-3.249
Conflicts (1453-1749)	(0.213)	(514.292)	(0.143)	(7.708)	(0.105)	(8.509)
N	99	99	99	99	99	99
Mean Outcome Variable	10.813	191.673	8.911	14.663	9.277	20.018
R^2	0.08067	-0.35155	0.69594	-0.30250	0.85998	-0.17287
Adjusted R^2	-0.00105	-0.47169	0.66891	-0.41827	0.84753	-0.27712
First-Stage F-Statistic	11.450	11.450	11.450	11.450	11.450	11.450

Notes: This table presents full second-stage 2SLS estimates of the impact of nomadic slave raids on district-level development outcomes in mid-19th century Galicia and Silesia, provinces of the Austrian Empire. The treatment variable is the logarithm of cumulative raids on a district, instrumented by its minimum distance to nine least-cost paths from the northern Black Sea coast to Lviv and Moscow. Robust standard errors in parentheses. $^*p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

D.5 First-Stage Results

TABLE A10. Slave Raids and Development Outcomes in Imperial Russia and Austria: First-Stage Results

Outcome:	Russian Empire (1)	Austrian Galicia & Silesia (2)
Distance to Least-Cost Paths	-0.003***	-0.005***
	(0.0004)	(0.002)
N	375	99
R^2	0.502	0.530
Adjusted R^2	0.481	0.489
Mean Outcome Variable	0.724	1.218
Controls	✓	✓
State FEs (1505 Borders)	✓	

Notes: This table reports first-stage estimates from our 2SLS analysis of the impact of nomadic slave raids on district-level development outcomes in mid-19th century Russia (panel A) and Austrian Galicia and Silesia (panel B). The outcome variable is the logarithm of cumulative raids on a district; the treatment variable is a district's minimum distance to nine least-cost paths from the northern Black Sea coast to Lviv and Moscow. All models control for urban population in 1400, land area, minimum distance to a river, minimum distance to a coastline, soil fertility, terrain ruggedness, and cumulative conflicts in 1453-1777; in column 1, temperature seasonality, precipitation, and distance to Moscow are also included. Robust standard errors in parentheses. $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

D.6 OLS Estimates

TABLE AII. Slave Raids and Development Outcomes in Imperial Russia and Austria: OLS Estimates

Panel A: Russian Empire						
Outcomes:	Population		Markets		Factories	
	Log Urban	Per km^2	Log Total	Per km^2	Log Total	Per km^2
	(1)	(2)	(3)	(4)	(5)	(6)
Log Cumulative Raids	0.168***	6.896***	0.030	0.0004*	0.336***	0.003**
	(0.050)	(2.551)	(0.064)	(0.0002)	(0.072)	(0.001)
N	358	372	362	362	363	363
R^2	0.372	0.446	0.164	0.390	0.248	0.196
Mean Outcome Variable	8.73	42.25	2.16	0	2.32	0.01
District-Level Controls	✓	✓	✓	✓	✓	✓
State FEs (1505 Borders)	✓	✓	✓	✓	✓	✓
Panel B: Austrian Galicia and Silesia						
Outcomes:	Population		Houses		Farm Structures	
	Log Total	Per km^2	Log Total	Per km^2	Log Total	Per km^2
	(1)	(2)	(3)	(4)	(5)	(6)
Log Cumulative Raids	0.168***	6.896***	0.030	0.0004*	0.336***	0.003**
	(0.050)	(2.551)	(0.064)	(0.0002)	(0.072)	(0.001)
N	358	372	362	362	363	363
R^2	0.372	0.446	0.164	0.390	0.248	0.196
Mean Outcome Variable	8.734	42.506	2.163	0.003	2.322	0.006
District-Level Controls	✓	✓	✓	✓	✓	✓

Notes: This table reports OLS estimates of the relationship between exposure to nomadic slave raids and various development outcomes (indicated in the header) in districts of the Russian Empire (panel A) and Austrian Galicia and Silesia (panel B) in the mid-19th century. The treatment variable is the logarithm of cumulative raids on a district. All models control for urban population in 1400, land area, minimum distance to a river, soil fertility, mean terrain ruggedness, and minimum distance to a coastline; in Panel A, temperature seasonality, mean precipitation, and distance to Moscow are additionally included. Robust standard errors in parentheses. $^*p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

D.7 Zero-First-Stage Placebo Test

TABLE A12. Zero-First-Stage Test: Distance to Least-Cost Paths and Development Outcomes in Northern versus Southern Russia

Panel A: Districts North of Moscow, which were too far for most raids							
Outcome:	Raids	Population		Markets		Factories	
	Log Cumul.	Log Urban	Per km^2	Log Total	Per km^2	Log Total	Per km^2
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Distance to Least-Cost Paths	0.001	0.001	-0.012	0.002	-0.00001	0.002	-0.00004
	(0.001)	(0.003)	(0.118)	(0.004)	(0.00001)	(0.004)	(0.0001)
N	160	150	157	155	155	155	155
R^2	0.216	0.462	0.395	0.165	0.164	0.340	0.276
Mean Outcome Variable	0.135	8.447	28.694	1.936	0.002	2.466	0.007
District-Level Controls	✓	✓	✓	✓	✓	✓	✓
State FEs (1505 Borders)	✓	✓	✓	✓	✓	✓	✓
Panel B: Districts South of Moscow, where distance to trails determined the frequency of raiding							
	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Distance to Least-Cost Paths	-0.004***	-0.001	-0.026***	-0.002***	-0.00001***	-0.002**	-0.00001
	(0.001)	(0.001)	(0.008)	(0.001)	(0.00000)	(0.001)	(0.00001)
N	215	208	215	207	207	208	208
R^2	0.424	0.270	0.611	0.272	0.411	0.177	0.169
Mean Outcome Variable	1.139	8.941	52.591	2.334	0.004	2.215	0.005
District-Level Controls	✓	✓	✓	✓	✓	✓	✓
State FEs (1505 Borders)	✓	✓	✓	✓	✓	✓	✓

Notes: This table presents OLS estimates of the relationship between distance to nine least-cost paths from the northern Black Sea coast to Lviv and Moscow and (1) the logarithm of cumulative nomadic slave raids and (2) various development outcomes in Russian imperial districts in the mid-19th century. The sample is divided into districts north (panel A, N = 160) and south (panel B, N = 215) of Moscow (latitude = 55.7558°N). All models control for urban population in 1400, cumulative military conflicts in 1453-1777, land area, minimum distance to a river, mean terrain ruggedness, minimum distance to a coastline, distance to Moscow, temperature seasonality, and mean precipitation. Robust standard errors in parentheses. $^*p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

D.8 Alternative Instrument: Distance to Crimea via Watershed Boundaries

FIGURE A23. Watershed Boundary Lines and Nomadic Trails

Notes: This map shows that the four principal trails used by nomads to conduct slave raids in the Black Sea region closely follow the boundary lines of watershed zones, an exogenous geographical feature that facilitated rapid movement across the steppe on horseback. Watershed boundaries are plotted at Level 5 (which includes inter-basin regions) with a shapefile created by Lehner and Grill (2013).

TABLE A13. Slave Raids and Development Outcomes in Imperial Russia and Austria: Robustness to Watershed Boundary Instrument

Panel A: Russian Empire						
Outcomes:	Population		Markets		Factories	
	Log Urban	Per km^2	Log Total	Per km^2	Log Total	Per km^2
	(1)	(2)	(3)	(4)	(5)	(6)
Log Cumulative Raids (Instrumented)	0.414***	16.193***	0.459**	0.001**	0.016	0.007**
	(0.145)	(4.552)	(0.195)	(0.001)	(0.231)	(0.003)
N	357	371	361	361	362	362
R^2	0.327	0.394	0.053	0.336	0.208	0.164
Mean Outcome Variable	8.734	42.506	2.163	0.003	2.322	0.006
District-Level Controls	✓	✓	✓	✓	✓	✓
State FEs (1505 Borders)	✓	✓	✓	✓	✓	✓
First-Stage F-Statistic	49.702	56.377	48.944	48.944	49.514	49.514
Panel B: Austrian Galicia and Silesia						
Outcomes:	Population		Houses		Farm Structures	
	Log Total	Per km^2	Log Total	Per km^2	Log Total	Per km^2
	(1)	(2)	(3)	(4)	(5)	(6)
Log Cumulative Raids (Instrumented)	0.362***	681.099***	0.124	15.305***	0.037	15.582***
	(0.132)	(231.313)	(0.091)	(5.205)	(0.072)	(5.409)
R^2	0.555	0.195	0.822	0.269	0.896	0.331
N	99	99	99	99	99	99
Mean Outcome Variable	10.813	191.673	8.911	14.663	9.277	20.018
District-Level Controls	✓	✓	✓	✓	✓	✓
First-Stage *F*-Statistic	15.961	15.961	15.961	15.961	15.961	15.961

Notes: This table shows that the results of our instrumental variables analysis of the impact of nomadic slave raids on district-level development outcomes in mid-19th century Russia (panel A) and Austrian Galicia and Silesia (panel B) are robust to an alternative instrument: minimum distance to Akkerman or Perekop along a watershed boundary line. We calculate this distance using a modified version of the Albers equal area conic map with standard parallels at 49.6667°N and 67.33334°N with a central meridian of 42.5°E. All models control for urban population in 1400, land area, minimum distance to a river, soil fertility, mean terrain ruggedness, and minimum distance to a coastline; in Panel A, temperature seasonality, mean precipitation, and distance to Moscow are additionally included. Robust standard errors in parentheses. $^*p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

E The Defensive State-Building Mechanism

E.1 Fortifications in Poland-Lithuania

FIGURE A24. Fortifications and Defense Lines against Nomadic Slave Raids

Notes: This map displays the location of major fortifications and defense lines constructed in response to nomadic slave raids. Nomadic trails and 1505 state borders are also indicated. Data on fortifications in Poland-Lithuania (voivodeships ruskie, bełskie, podolskie, bracławskie, and kijowskie) was digitized from Adamczyk (2004) and geocoded by the authors. Defense lines in Russia were plotted by the authors based on maps and lists of garrison towns in Davies (2007).

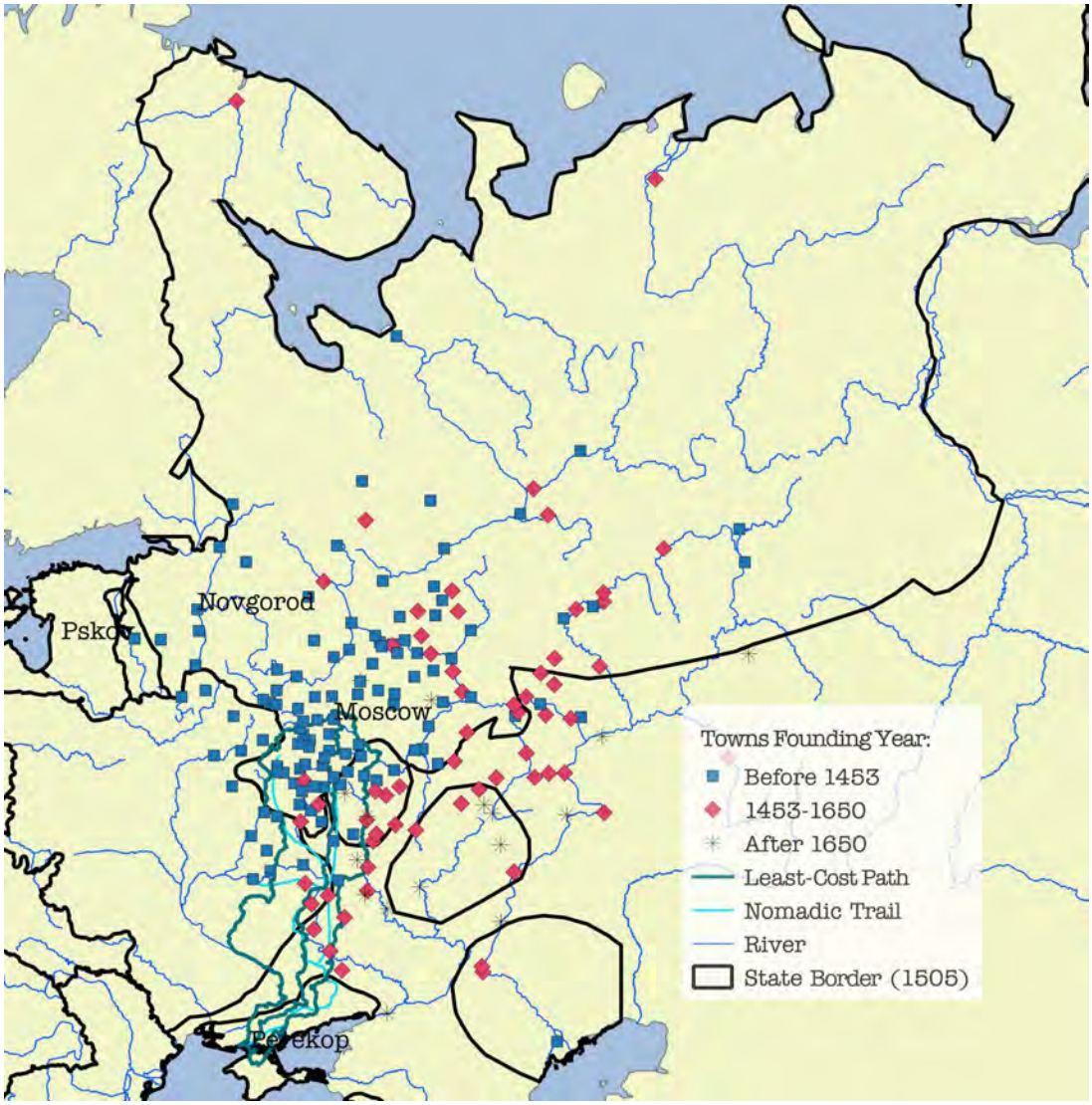
TABLE A14. Slave Raids and Fortification Density in Poland-Lithuania: Robustness Checks

Outcomes: # per Grid Cell of...	Major Castles (1)	Small Castles (2)	Fortified Towns (3)	Fortified Villages (4)	Fortified Churches (5)	Fortifications Built (Any) (6)
Panel A: Sample Restricted to Poland (1500 Borders)						
Grid Cell Raided	2.186***	1.194***	1.237***	0.110***	0.818***	6.612***
	(0.317)	(0.227)	(0.194)	(0.039)	(0.155)	(0.911)
N	1,096	1,096	1,096	1,096	1,096	1,096
R^2	0.606	0.496	0.581	0.438	0.540	0.584
Mean Outcome Variable	0.171	0.007	0.126	0.004	0.020	0.367
Panel B: Sample Restricted to Lithuania (1500 Borders)						
Grid Cell Raided	0.763***	0.034**	0.579***	0.018	0.063***	1.686***
	(0.113)	(0.013)	(0.097)	(0.011)	(0.020)	(0.252)
N	3,232	3,232	3,232	3,232	3,232	3,232
R^2	0.494	0.300	0.445	0.264	0.631	0.497
Mean Outcome Var.	0.171	0.007	0.126	0.004	0.020	0.367
Panel C: Sample Restricted to Period 1100-1700						
Grid Cell Raided	1.255***	0.415***	0.780***	0.047***	0.328***	3.257***
	(0.140)	(0.086)	(0.089)	(0.015)	(0.062)	(0.375)
N	4,284	4,284	4,284	4,284	4,284	4,284
R^2	0.509	0.364	0.466	0.303	0.460	0.478
Mean Outcome Var.	0.108	0.027	0.060	0.002	0.034	0.244
Panel D: Sample Restricted to Period 1100-1600						
Grid Cell Raided	0.956***	0.266***	0.495***	0.035**	0.304***	2.227***
	(0.134)	(0.073)	(0.078)	(0.016)	(0.065)	(0.323)
N	3,672	3,672	3,672	3,672	3,672	3,672
R^2	0.500	0.400	0.489	0.315	0.482	0.500
Mean Outcome Var.	0.108	0.027	0.060	0.002	0.034	0.244
Grid Cell FEs	✓	✓	✓	✓	✓	✓
Period FEs	✓	✓	✓	✓	✓	✓

Notes: This tables examines whether our grid cell-level difference-in-differences estimates of the impact of nomadic slave raids on the construction of permanent fortifications in the southern Polish-Lithuanian Commonwealth (Table 2) are robust to subsetting the sample to different areas and periods of the slave trade. The outcome variable is the density of various types of fortifications (specified in the header) in a grid cell; the treatment variable is a dummy for whether a grid cell has been raided. The sample comprises 137 0.5×0.5° grid cells in Poland (1505 borders) observed at eight times between 1100 and 1800 in panel A; 404 grid cells in Lithuania (1505 borders) observed 13 times between 1100 and 1800 in panel B; 612 grid cells in southern Poland-Lithuania (1600 borders) observed 13 times between 1100 and 1700 in panel C; and 612 grid cells in southern Poland-Lithuania (1600 borders) observed 13 times between 1100 and 1600 in panel D. Fortifications data were digitized from Adamczyk (2004) and geocoded by the authors. Robust standard errors, clustered by grid cell, in parentheses. $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

E.2 Military, Administrative, and Fiscal Capacity in Imperial Russia

FIGURE A25. Russian Urban Communities, 1646-1722



Notes: This map displays the location of Russian communities with the right to engage in commerce or industry (*posads*) in the 17th and early 18th centuries, whose population we analyze in panel A of Table 3. The data, which were compiled by Vodarskii (1966) and digitized and geocoded by the authors, are based on the Russian censuses of 1646-47, 1649-52, 1678-79, and 1722. Dates of founding were gathered by the authors.

TABLE A15. Summary Statistics for Russian Urban Communities Dataset

	N	Mean	St. Dev.	Min	Max
Servicemen (*Sluzhilye*)					
Servicemen Households, 1650	108	537.667	2,013.518	1	20,000
Servicemen Households, 1670-80	28	135.786	174.372	1	643
Servicemen Individuals, 1670-80	111	652.054	2,003.714	2	20,048
Traders and Artisans (*Posadskie*)					
Trader and Artisan Households, 1646	134	245.507	368.501	2	2,871
Trader and Artisan Households, 1652	99	356.889	565.277	5	3,615
Trader and Artisan Households, 1670-80	160	281.062	615.585	1	7,043
Trader and Artisan Individuals, 1646-52	138	775.072	1,304.392	8	9,399
Traders and Artisan Individuals, 1670-80	162	780.870	1,695.748	4	19,720
Traders and Artisan Individuals, 1722	176	1,006.097	1,433.595	2	13,673
Slave Raids					
Distance to Least-Cost Paths	194	280.879	290.977	0.102	1,491.203
Log Cumulative Raids, 1646	194	1.469	3.466	0	34
Log Cumulative Raids, 1670	194	1.670	3.749	0	34
Control Variables					
Distance to Coastline	194	630.406	216.887	20.807	1,163.945
Minimum Distance to River	194	27.153	31.694	0.001	129.673
Date of Founding/First Mention	191	1,358.932	226.077	753	1,731
Distance to Moscow	194	440,238	278,625.500	0	1,522,273
Inclusion in 1505 Russia Borders	194	0.727	0.447	0	1

Notes: This table reports summary statistics for variables in our analysis of Russian urban community (*posad*) population between 1646 and 1722 (panel A, Table 3). The data, which were compiled by Vodarskii (1966) and digitized and geocoded by the authors, are based on the Russian censuses of 1646-47, 1649-52, 1678-79, and 1722. Dates of founding were gathered by the authors.

TABLE A16. Slave Raids and Defensive State Capacity in Russian Urban Communities: Full Estimates

Outcome:	Log Military/State Officials		Log Traders and Artisans		
	Households (1650)	Individuals (1678-79)	Households (1646)	Households (1678-79)	Households (1722)
	(1)	(2)	(3)	(4)	(5)
Log Cumulative Raids by 1646 (Instrumented)	1.034**		-1.215***		
	(0.425)		(0.398)		
Log Cumulative Raids by 1670 (Instrumented)		1.469***		-0.738***	-0.589**
		(0.311)		(0.247)	(0.257)
Distance to Moscow	0.00000	0.00000**	0.00000	0.000	-0.00000
	(0.00000)	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Distance to Coastline	-0.002***	-0.002***	0.002**	0.001	0.0004
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Distance to River	-0.004	0.005	-0.009*	-0.005	-0.005
	(0.005)	(0.006)	(0.005)	(0.004)	(0.004)
Age	0.001	0.002**	-0.005***	-0.003***	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Within 1505 Muscovy	-1.518***	-0.985**	-0.173	-0.216	-0.290
	(0.381)	(0.449)	(0.422)	(0.300)	(0.269)
N	108	110	133	157	175
Mean Outcome Variable	4.857	5.045	4.644	4.806	6.209
First-Stage F-Statistic	23.880	60.349	37.391	74.367	68.789
R^2	0.356	0.253	-0.148	-0.016	0.056

Notes: This table presents full second-stage 2SLS estimates of the impact of nomadic slave raids on indicators of defensive state capacity (columns 1-2) and commercial activity (columns 3-5) in Russian urban communities (*posads*) in 1646-1722 (from panel A, Table 3). The treatment variable is the logarithm of cumulative raids on a community before the outcome is measured (either 1646 or 1679), instrumented by its minimum distance to nine least-cost paths from the northern Black Sea coast to Lviv and Moscow. Robust standard errors in parentheses. $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

TABLE A17. Slave Raids and Defensive State Capacity in Imperial Russian Districts: Full Estimates

Outcome:	State Officials (1897)		Military Officials (1897)		Arrears (1893-95)
	Per 1k Pop.	Per km^2	Per 1k Pop.	Per km^2	/Tax Owed
	(6)	(7)	(8)	(9)	(10)
Log Cumulative Raids	-0.031	0.006***	0.116**	1.798**	-0.188*
(Instrumented)	(0.060)	(0.002)	(0.049)	(0.879)	(0.111)
Distance to River	-0.0002	-0.00001	-0.0004	-0.004	-0.001
	(0.001)	(0.00002)	(0.0004)	(0.008)	(0.001)
Distance to Moscow	0.0004***	0.00002***	0.0004***	0.007***	-0.0004*
	(0.0001)	(0.00000)	(0.0001)	(0.002)	(0.0002)
Soil Quality	-0.113	-0.008**	-0.110	-2.227	0.574***
	(0.119)	(0.004)	(0.097)	(1.744)	(0.221)
Terrain Ruggedness	-0.0003	0.00001	-0.0001	-0.012	0.011***
	(0.002)	(0.0001)	(0.002)	(0.032)	(0.004)
Log Urban Population in 1400	-0.041	0.00002	-0.038	0.566	0.025
	(0.045)	(0.002)	(0.037)	(0.662)	(0.086)
Cumulative Conflicts	-0.031	-0.0005	0.004	0.135	0.002
	(0.025)	(0.001)	(0.020)	(0.362)	(0.047)
Log Land Area	0.053	-0.008***	-0.094***	-1.382**	0.037
	(0.040)	(0.001)	(0.033)	(0.593)	(0.077)
Distance to Coastline	0.00003	-0.00001	-0.00004	-0.001	0.001***
	(0.0002)	(0.00001)	(0.0001)	(0.003)	(0.0003)
Temperature Seasonality	-0.001	0.00000	-0.001	-0.017*	-0.003**
	(0.001)	(0.00002)	(0.001)	(0.009)	(0.001)
Mean Precipitation	0.0003	0.00002	0.0001	-0.002	-0.001
	(0.001)	(0.00002)	(0.0004)	(0.008)	(0.001)
N	357	357	357	357	365
R^2	0.255	0.209	0.184	0.167	0.289
Mean Outcome Variable	0.482	0.015	0.072	1.497	0.379
State FEs (1505 Borders)	✓	✓	✓	✓	✓
First-Stage F-Statistic	52.092	52.092	52.092	52.092	55.353

Notes: Second-stage 2SLS estimates of the relationship between nomadic slave raids and indicators of defensive state capacity in Russian imperial districts in the 1890s (from panel B in Table 3). The treatment variable is the logarithm of cumulative raids on a district, instrumented by its minimum distance to nine least-cost paths from the northern Black Sea coast to Lviv and Moscow. Robust standard errors in parentheses. $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$.

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